Digital force: disrupting life, liberty and livelihood in the information age

Keulen, R.J.F. van

5 Large-Scale Theft of Intellectual Property as Aggrandizement of Cyber Territory

"Shylock: *No, go ahead and take my life. Don't pardon that. You take my house away when you take the money I need for upkeep. You take my life when you take away my means of making a living.*"[385]

5.1 Introduction

In William Shakespeare's *The Merchant of Venice* Bassanio, three parties agree to a contract. Bassanio, a Venetian noble man, seeks to loan a sum of 3000 ducats to invest in a shipping expedition, after having previously already squandered his estate. He approaches his friend, Antonio, a Venetian merchant, for the loan. Although Antonio is willing to provide the loan to Bassanio, he is unable to do so because his ships and merchandise are out at sea at the time. However, Antonio agrees to act as the loan's guarantor for when Bassanio can find another lender. This lender is eventually found in Shylock, a Venetian Jew and money-lender. Shylock agrees to lend Bassanio, an outspoken anti-Semite who has previously antagonized Shylock, the sum, under the condition that, as an insurance to the loan, should Bassanio fail to repay the loan at a specified date, Shylock may then exact a 'pound of flesh' from Antonio, literally. After deliberation, Bassanio and Antonio agree to the terms as set out by Shylock and the contract is signed.

Unfortunately, this time as well, luck is not on Bassanio's side and this expedition too fails. The story progresses with a default on the payment and with Shylock taking Antonio to court to exact his 'pound of flesh'. After some discussion, Shylock is initially allowed to exact his pound of flesh as per the agreement. Soon thereafter however, the judge declares that although Shylock may take the pound of flesh, he may not take a gram more or less, lest Shylock be locked up. Additionally, Shylock may also not take the blood of Antonio as this is considered by the judge not to be included in the agreement. Moreover, the judge also declares that Shylock is in violation of another Venetian law, namely the law that holds that if a foreign resident -

[385] W. Shakespeare, The Merchant of Venice (Modern translation), *available at*: http://nfs.sparknotes.com/merchant, Act 4, Scene 1, Page 16, lines 355-369.

such as Jews like Shylock, who live in Venice's Jewish ghetto[386] and not in Venice proper – make a direct or indirect attempt to kill any citizen of Venice, that the person he tried to kill may take half of this foreigner's property, with the other half going to the state.[387] Further, this law stipulates that Shylock's life is now to be decided by the Duke.[388] The Duke, after some deliberation, decides to spare the life of Shylock and to forfeit the half of Shylock's property which is to go to the state. The other half is still to go to Antonio. Shylock, perhaps initially surprising to many, rejects the offer.

The predicament of Shylock is dire and, perhaps surprisingly, uniquely suitable to illustrate the overarching goal of this chapter, namely the importance of protecting intellectual property in cyberspace. To Shylock, the proposed sentence did not just amount to a harsh (and arguably unjust[389]) punishment and a major financial setback. Rather, it could be argued that it continued to amount to a death sentence. As a Jew living in 16th century Italy, Shylock was not allowed to own land for farming, nor was he allowed to exercise professions or serve in government. Resultantly, with the factors of production of *land* or *labor* not available to him, the only factor of production open to Jews like Shylock was that of *capital*.[390] However, in order to make a living from capital, money-lending requires a certain amount of capital to lend

[386] The name 'ghetto' comes from the word *gheta*, which means 'snail' in the Venetian dialect of Italian. It refers to so-called snails in metallurgy, which is a byproduct of foundries that looks like a mesh of snails. The Jewish living spaces in Venice were built on the spot where the iron foundries let the snails cool off.

[387] *See* W. Shakespeare, The Merchant of Venice (Modern translation), *available at*: http://nfs.sparknotes.com/merchant, Act 4, Scene 1, Page 15, lines 338-348, "Wait a minute, Jew. The law has another hold on you. The laws of Venice state that if a foreign resident directly or indirectly attempts to kill any citizen, the person he tried to kill will receive one half of the foreigner's goods. The other half goes to the state. Whether the offending person lives or dies is up to the duke—there's no one else to appeal to. In your predicament you've earned that punishment, because you've clearly contrived indirectly—and directly too—to take the life of the defendant. So get down on your knees and beg mercy from the duke.".

[388] *See* Shakespeare, The Merchant of Venice, Act 4, Scene 1, Page 15, lines 338-348.

[389] *See* Shakespeare, The Merchant of Venice, Act 3, Scene 1, Page 3, lines: "Doesn't a Jew have eyes? Doesn't a Jew have hands, bodily organs, a human shape, five senses, feelings, and passions? Doesn't a Jew eat the same food, get hurt with the same weapons, get sick with the same diseases, get healed by the same medicine, and warm up in summer and cool off in winter just like a Christian? If you prick us with a pin, don't we bleed? If you tickle us, don't we laugh? If you poison us, don't we die? And if you treat us badly, won't we try to get revenge? If we're like you in everything else, we'll resemble you in that respect." Contrary to modern legal systems, the Venetian legal system had different (sets of) rules for the different peoples living under its sovereignty. The rule which has been applied to punish Shylock could not be applied to the other, non-Jewish residents of Venice.

[390] *See* Smith, *The Wealth of Nations*, Chapter VI. In economics, the factors of production refer to the different types of inputs which, taken together, create an economic output, such as a product or service. It is this output which translates to economic value one can monetize to make a living from. In the classic definition, the factors of production are defined mutually exclusive and collectively exhaustive as land, labor and capital. Land refers to natural resources like water, air and soil, as well as the natural resources above and below them. Labor refers to the manual and mental efforts one undertakes to extract natural resources, process them [designs]. Capital refers to the technology and other goods (such as buildings, infrastructure and intellectual property) used for the production of goods and services. In more modern definitions, entrepreneurship and human capital are sometimes separated from their overarching category of labor and technology is sometimes separated from its overarching category of capital.

out to charge interest on. If half of Shylock's capital would be taken away, then, according to Shylock, he would not be able to continue (making a) living. In the eyes of Shylock, the choice between death and surrender of the means by which to make a living thus amounted to a false choice. Shylock thus replied with the words: "*No, go ahead and take my life. Don't pardon that. You take my house away when you take the money I need for upkeep. You take my life when you take away my means of making a living.*".[391]

This chapter will argue, pursuant to the legal and moral philosophy behind the principles of State sovereignty, that in the Information Age, as described in Chapter 2, our economic activity is very comparable to that of Shylock in the 16th century and that as a consequence, cyber operations which engage in large-scale, state-sponsored theft of intellectual property should be understood as territorial aggrandizement of cyber territory, analogous to physical territorial aggrandizement through large-scale, state-sponsored attacks using traditional kinetic means (*e.g.*, artillery shelling, naval attacks, aerial strikes, *et cetera*).

As explained in Chapter 3, State sovereignty is ultimately derived from the inherent drive of people to self-determination and the protection thereto by the State of the vital interests of individuals, namely; life, liberty and property, as well as their collective forms in the shape of state sovereignty, political independence and territorial integrity. This chapter and Chapter 6 deal with the inverse of State sovereignty, namely breaches to self-determination. Chapter 6 deals with threats to cyber *services* such as through the durable disruption of critical infrastructures. This chapter will continue to deal with threats to cyber *products* such as through the large-scale theft of intellectual property.

This chapter contains three main sections, dealing with, subsequently, *res nullius*, *terra nullius* and *data nullius.*

Section 5.2 will deal with *res nullius*. In this section, the legal and moral foundation for the concept of property will be set out in general and specifically, the legal and moral foundation of ownership over *physical objects.* It is argued here that ultimately, all property rights are derived from the addition of value by a person (or through the proxy of a legal entity) to natural resources which previously had the status of *res nullius*. Section 5.3 deals with *terra nullius.* This section will deal with *land* and how the cultivation of *terra nullius* establishes ownership over it. This section also addresses Rousseau's objections to property rights in general and

[391] *See* Shakespeare, The Merchant of Venice, Act 4, Scene 1, Page 16, lines 355-369

specifically, those objections to property rights over land. Section 5.4 will deal with *data nullius*. In this section, it is discussed why, from a moral and legal perspective, people can own not just land and physical objects, but also ideas when these ideas have previously been, what I call, '*data nullius*'. In this section, the differences and similarities will be discussed between gaining ownership through manual labor (objects and lands) and mental labor (ideas). In this section, it is also argued that protecting *intellectual* property is the pre-requisite to being able to 'make a living' in the Information Age.

Throughout this chapter, a legal and moral theory for the information age on property rights is built from the ground up. This theory starts with the state of nature and how in the state of nature, social animals, including humans, own their labor. From there it will be discussed how this labor can be used to provide services to other members of the group in exchange for social currency, which can be cashed in on in exchange for other services. Subsequently, we leave (most of) the rest of the animal kingdom behind us, as we discuss how *Homo sapiens* attains ownership over *physical objects* by mixing his labor with the natural resources in his surroundings. Thereafter, we will discuss how, through the mixture of his labor with land, *Homo sapiens* can attain ownership over *land*. Finally, we will discuss how ownership over *ideas* is established. By doing so, this section will bring our discussion on property and territorial integrity into the Information Age. The chapter will conclude in Section 5.5 where a summary and concluding observations are provided.

5.2 From *Res Nullius* to Ownership over Physical Objects

As set out in Section 3.3, I believe that the pervasive recognition of the right to property in political philosophy as well as in regional and international legal systems across time and space is not a historical coincidence, but rather, that it reflects a fundamental logic to legal systems which is demonstrated by both philosophy and theory, as well as by law and practice.[392] This logic is that the right to property is derived from our human nature and from our inherent drive to self-determination.

[392] *See* Section 3.2; *see also* J. Locke, Second Treatise of Government, sect. 25: "Whether we consider natural reason, which tells us, that men, being once born, have a right to their preservation, and consequently to *meat and drink, and such other things as nature affords for their subsistence.*". (emphasis added); *see also* Rousseau, On the Inequality among Mankind, part II: "Man's first feeling was that of his own existence, and *his first care that of selfpreservation.*" (emphasis added)

Understanding that the right to property is a pre-requisite to Man's self-determination, does however not explain where and when this right originates. I believe therefore that any discussion on property rights – both individual, private property rights, as well as collective, public property rights – requires one to start at the beginning, with the state of nature.

Originally, when Man was a hunter/gatherer wandering around the plains of Africa, adapting to his surroundings, he was more alike than unlike the other animals. Man was just another primate roaming around, looking for food and fending off others through the threat or the use of pre-emptive, preventive and punitive force.[393] The trees and the animals in his surroundings did not belong to him, yet.[394] Instead, the concept of ownership over property in the state of nature was either completely absent or it was limited to the duration during which one could hold some piece of fruit or meat in his hand and successfully fight others off from taking it from him. Man lived in the moment. Food did not spoil.

Man did own one thing and from this, ultimately, all ownership originates; his *labor*.[395]

Among social animals, it is understood that members of a group have ownership over their labor. Given that nearly all social animals do not build *products*, in order to understand this concept in the animal kingdom, we need to look at the *services* which they provide to the other members of their respective groups. Among social animals, there is a basic, implicit understanding that the services which the members of these groups provide to each other – such as grooming, protection and prostitution[396] - are *owned* by the providers of these services. One notably example which is very illustrative of the understanding of ownership among social animals was in a 2005 Yale study on the behavior of capuchin monkeys.[397] In the study a group of researchers taught a group of capuchin monkeys how to use money to pay for food.[398] Subsequently, the monkeys were given a certain budget to spend how they wished, such as on

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[393] *See supra* Section 3.2.
[394] *See* Locke, *Second Treatise of Government*, Chapter 5, section 26: "God, who hath given the world to men in common, hath also given them reason to make use of it to the best advantage of life, and convenience. The earth, and all that is therein, is given to men for the support and comfort of their being. And tho' all the fruits it naturally produces, and beasts it feeds, belong to mankind in common, as they are produced by the spontaneous hand of nature; and *no body has originally a private dominion, exclusive of the rest of mankind*, in any of them, as they are thus in their natural state.". (emphasis added)
[395] *See* Locke, Second Treatise of Government, Chapter 5, section 27: " Though the earth, and all inferior creatures, be common to all men, yet every man has a property in his own person: this no body has any right to but himself. *The labour of his body, and the work of his hands, we may say, are properly his.*". (emphasis added)
[396] *See supra* Section 3.2. Unsurprisingly, the basic services which social animals provide to each other often are related to the twin goals of survival (protection) and reproduction (prostitution).
[397] *See* S. Dubner, S. Levitt, Monkey Business, New York Times, 5th June, 2005, *available* at: http://www.nytimes.com/2005/06/05/magazine/monkey-business.html (accessed on 31st July, 2017).
[398] *Id.*

different types and/or amounts of food.[399] The researchers wanted to find out how these primates would use their ability to use money to respond to different economic situations – such as gambling, egoism/altruism, time preference *et cetera*.[400] However, the researchers soon noticed that these monkeys were much more human than previously thought. When the monkeys learned that money held value which could be used to buy goods and services, they soon observed one male monkey using his money to pay a female monkey for sex.[401] After the exchange took place, the female monkey used the money to buy a grape.[402] In other words, when these monkeys learned the value of money, they reinvented the world's proverbial oldest profession. The researchers subsequently had to change the setup of their experiments to prevent the lab from turning into a brothel.[403]

Even when the understanding of ownership over services is not as explicit as in this example – with money as a medium of exchange - we can observe an implicit understanding of this concept throughout different species of social animals. They understand the underlying *social currency* which is transferred when services are provided. Actually, it is this very understanding which is the pre-requisite to allow their lives to become social. The services which social animals provide to each other in exchange for social currency can be cashed in on in different ways, even without physical currency as an intermediary. The services can be exchanged in an immediate *quid pro quo* fashion. For example, one monkey might groom another monkey and after completing the service, turn around, point at his back, and expect the service to be reciprocated right then and there. Alternatively, a monkey may deliberately groom another monkey who is higher up the social ladder without expecting to be groomed in return, but in order to acquire political capital which can be cashed in on at a later date. Brains evolve to keep score.

Certainly, there is risk involved in providing a service in exchange for social currency rather than for a physical store of value such as money (or in exchange for a physical product). The latter category can be cashed in on with much greater certainty than the former. All that is required is to keep the money (or product) until it is exchanged. However, even though no social animal besides *Homo sapiens* exchanges physical products (and until recently, money),[404] it

[399] *Id.*
[400] *Id.*
[401] *Id.*
[402] *Id.*
[403] *Id.*
[404] *See* A. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776) (hereinafter: "The Wealth of Nations), Chapter II: "*Nobody ever saw a dog make a fair and deliberate exchange of one bone for another with*

can still be expected that even in the absence of the medium of exchange of the Yale experiment, that there exists ownership over the social currency which social animals exchange through their services to each other. Although we have yet to find a way to communicate with animals with sufficient complexity to get such answers directly verbalized, there are many clues. Besides situations such as those described in the previous paragraph (of which there are many), perhaps the strongest clue that social animals keep a social currency score with the fellow members of their respective groups, is the so-called 'Dunbar's number'.[405] The primatologist Robin Dunbar discovered that there exists a strong correlation among different primate species between the size of their respective neo-cortexes and the size of their social groups.[406] Given that primate brains have a shared evolutionary history, it is believed that the reason for this strong correlation is that the size of the neo-cortex of a particular primate species provides a functional, cognitive limit to the amount of relationships they can maintain.[407] In other words, primate groups can maintain social cohesion only so far and so long as the members of the group can keep track of the relations and the social currency scores they have with the other members of the group.[408] When the amount of social relations within a group increases beyond this functional, cognitive limit, social cohesion within these groups breaks down as relations cannot be maintained and the groups themselves, break apart.

Gradually, but steadily, one such social animal in particular, *Homo sapiens*, attained ownership not just over his labor and the services he provides to the other members of his group with this labor, but also over much of his physical surroundings as well. He did this through the mixture of his labor with the natural resources in his surroundings.[409] The factor of production

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another dog. Nobody ever saw one animal, by its gestures and natural cries signify to another, this is mine, that yours; I am willing to give this for that. When an animal wants to obtain something either of a man, or of another animal, it has no other means of persuasion, but to gain the favour of those whose service it requires. A puppy fawns upon its dam, and a spaniel endeavours, by a thousand attractions, to engage the attention of its master who is at dinner, when it wants to be fed by him.". (emphasis added)

[405] *See generally* M. Gladwell, *The Tipping Point* (2000), p. 169-192.

[406] *Id.*

[407] *Id.*

[408] *See generally* Gladwell, *The Tipping Point*, p. 169-192. The Dunbar number for *Homo sapiens* which corresponds to the size of our average neo-cortex would predict our average group size to be between 100-200 members. This number corresponds to the history of *Homo sapiens* during the times when we lived in a band society.

[409] *See* Locke, *Second Treatise of Government*, Chapter 4, section 28: "He that is nourished by the acorns he picked up under an oak, or the apples he gathered from the trees in the wood, has certainly appropriated them to himself. No body can deny but the nourishment is his. *I ask then, when did they begin to be his? when he digested? or when he eat? or when he boiled? or when he brought them home? or when he picked them up?* and it is plain, if the first gathering made them not his, nothing else could. That labour put a distinction between them and common: that added something to them more than nature, the common mother of all, had done; and so they became his private right." (emphasis added)

of *labor* became mixed with the factor of production of *land* and the *physical objects* which resulted from this mixture is his *property*.[410]

Thoughtful people can disagree on the exact *moment* when Man started owning (parts of) his surroundings, but most will agree that the *method* by which Man originally started owning (parts of) his surroundings was through a mixture of his labor with the natural resources in his surroundings.[411] Some may argue that all that is required for ownership to be established over a *physical object* is to climb a certain tree and to pluck its fruits, or to dig the earth to unearth a vegetable or to track, chase, catch and kill an animal, in order for ownership to come into being over that specific piece of fruit, vegetable or piece of meat.[412] This view reminds us of a line in the poem in *The Jungle Book* which was used to introduce Chapter 3: "*The Kill of the Wolf is the meat of the Wolf. He may do what he will; But, till he has given permission, the Pack may not eat of that Kill.*".[413] If one extracts a natural resource from nature, then, according to this view, it is extracted from the public into the private domain. This view would entail that ownership over physical objects is not an exclusively human affair, but that it exists among non-human animals as well. Indeed, among many social animals theft of gathered or hunted food evokes defensive behavior of the kind that would suggest a rudimentary understanding of the concept of ownership over physical objects. Others may argue that ownership only originates over produced *products.* That is, ownership only originates when some kind of

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[410] *See* Locke, *Second Treatise of Government*, Chapter 5, section 28.

[411] *See* Locke, *Second Treatise of Government*, Chapter 5, section 27: "It being by him removed from the common state nature hath placed it in, *it hath by this labour something annexed to it, that excludes the common right of other men*: for this labour being the unquestionable property of the labourer, no man but he can have a right to what that is once joined to, at least where there is enough, and as good, left in common for others.". (emphasis added)

[412] *See* Locke, *Second Treatise of Government* Chapter 5, section 27: "*Whatsoever then he removes out of the state that nature hath provided*, and left it in, he hath mixed his labour with, and joined to it something that is his own, and thereby makes it his property. *It being by him removed from the common state nature hath placed it in*, it hath by this labour something annexed to it, that excludes the common right of other men: for this labour being the unquestionable property of the labourer, no man but he can have a right to what that is once joined to, at least where there is enough, and as good, left in common for others." (emphasis added); Chapter 5, section 28: "*He that is nourished by the acorns he picked up under an oak, or the apples he gathered from the trees in the wood*, has certainly appropriated them to himself. No body can deny but the nourishment is his." (emphasis added); Chapter 5, section 30: "Thus this law of reason *makes the deer that Indian's who hath killed it; it is allowed to be his goods*, who hath bestowed his labour upon it, though before it was the common right of every one. And amongst those who are counted the civilized part of mankind, who have made and multiplied positive laws to determine property, this original law of nature, for the beginning of property, in what was before common, still takes place; and by virtue thereof, *what fish any one catches in the ocean*, that great and still remaining common of mankind; or *what ambergrise any one takes up here*, is by the labour that removes it out of that common state nature left it in, made his property, who takes that pains about it. And even amongst us, the hare that any one is hunting, is thought his who pursues her during the chase: for being a beast that is still looked upon as common, and no man's private possession; whoever has employed so much labour about any of that kind, as to find and pursue her, has thereby removed her from the state of nature, wherein she was common, and hath begun a property." (emphasis added)

[413] R. Kipling, The Jungle Book, The Law of the Jungle.

additional, original value has been created or produced, such as through the taming, breeding and raising of wild animals in pastoralist societies or through the domestication, breeding, sowing, growing and reaping of fruits, vegetables and grains in agricultural societies.[414] In other words, some may argue that *capture* or *extraction* of natural resources from their surroundings is sufficient labor and mixture of labor with land to originate ownership over a physical object,[415] whereas others will argue that only *creation* or *production* based on natural resources is sufficient labor to originate ownership over a product.[416] Whether one accepts the former view of the (literal) fruits of one's labor or the latter view that one must adapts one's surroundings rather than *vice versa*, the disagreement is a disagreement of *degree*, not a disagreement of *kind*. Hence, what thoughtful people do not disagree on is the principle that the greater the relative value of the labor compared to the value of the overall object and its constituent natural resources, the stronger the claim of ownership of the laborer will be. We see this exemplified clearly when someone plucks from a tree which someone else has planted and grown. In this case, the claim of the grower is considered to be stronger than that of the plucker, as the labor of the grower has been decidedly greater than that of the plucker. Hence, the plucker may not take this particular piece of fruit without the explicit or implicit permission of the grower and the grower may ward him off until such permission is given.

We can assume that the recognition of the principle that the right to property over physical objects originates from a sufficient degree of admixture of one's labor with natural resources in one's surroundings, reflects historical reality dating all the way back to early hunter/gatherer societies. Although it might seem likely that in primitive society moral and legal ownership over property would have held little protection, as there is no police or court system in such a situation upon whom one can call, in fact, at second consideration, a more likely scenario seems to be that ownership did in fact provide sufficient protection to convince people to keep laboring for the production of physical objects. For example, even though a strong man

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[414] *See* Locke, *Second Treatise of Government*, Chapter 5, section 32: "But the chief matter of property being now not the fruits of the earth, and the beasts that subsist on it, but the earth itself; as that which takes in and carries with it all the rest; *I think it is plain, that property in that too is acquired as the former. As much land as a man tills, plants, improves, cultivates, and can use the product of, so much is his property.* He by his labour does, as it were, inclose it from the common. Nor will it invalidate his right, to say every body else has an equal title to it; and therefore he cannot appropriate, he cannot inclose, without the consent of all his fellow-commoners, all mankind. *God, when he gave the world in common to all mankind, commanded man also to labour*, and the penury of his condition required it of him. God and his reason commanded him to subdue the earth, i.e. improve it for the benefit of life, and therein lay out something upon it that was his own, his labour. He that in obedience to this command of God, subdued, tilled and sowed any part of it, thereby annexed to it something that was his property, which another had no title to, nor could without injury take from him." (emphasis added)

[415] *See* Locke, *Second Treatise of Government* Chapter 5, section 27-30.

[416] *See* Locke, *Second Treatise of Government* Chapter 5, section 32.

could simply take the (literal or figurative) fruits of another man's labor through the use or the threat to use force if this latter man is physically weaker, it would seem likely that the stronger the claim to ownership of the weaker man pursuant to the principle discussed in the previous paragraphs, that there would be a correspondingly strong rejection by the other members of the group of this act and a corresponding political cost for the actor. Imagine the situation in a primitive hunter/gatherer society when a young man has just finished constructing a new spear. He has spent countless hours finding the perfect branch, sharpening and hardening its sharp end in fire and he has even customized it with the image of a honey badger, with which he identifies. The village has seen him toiling and working for days and knows that he is probably soon going out to try to kill a lion, a rite of passage which will earn him the right to choose a wife. Now along comes the alpha male of the group, in the prime of his physical strength, who takes the spear from him by force. Moreover, not only does the alpha male take the spear from him, but he also whacks him over the head with the back of it, turning the newly produced spear against its very creator. It would seem that the young man would have to retreat, lick his wounds and await his time, possibly when the alpha male starts showing some gray hairs. However, it seems more likely that group members of evolutionary successful groups would have – either explicitly or implicitly - recognized that the survival- and reproductive success of their group depends upon every member of the group being able to generally enjoy the fruits of their own labor.[417] Moreover, if the young man could not enjoy the fruits of his own labor, then this would also set a disturbing precedent for their own labors. Labor could quickly turn into a cheap commodity for all the members of the group. It is not unlikely that groups within early hunter/gatherer society, just as with other primates, would try to maintain social cohesion by keeping track of such transgressions against property rights by mentally subtracting an amount of social currency from their scoreboard of the alpha male and that they would eventually band up together in revolt if the situation becomes untenable and the social currency score becomes too low.[418] In other words, ownership in early hunter/gatherer societies did not just exist over labor, services and physical objects which have been extracted from their surroundings, but it likely also and especially existed over *products*. Groups which established and enforced rules around ownership over products would collectively enjoy the fruits of more such labors and

[417] *See e.g.* F. de Waal, *Chimpanzee Politics: Power and Sex Among Apes* (2007) (hereinafter: "Chimpanzee Politics"), p. 137-150. De Waal observed that among Chimpanzees within individuals there is both a lust for power and the use of force (he opened his book with a quote from Hobbes: "*I put for the general inclination of all mankind, a perpetual and restless desire of power after power, that ceaseth only in death*.") and also that for the group itself, there are dynamics which point towards peaceful behavior towards next of kin and kind.
[418] *See* De Waal, *Chimpanzee Politics*, p. 137-150.

laborers and would consequently enjoy greater survival- and reproductive success through special products for hunting, fishing, gathering and cooking. Nature selected in favor of those groups which did establish and enforce property rights and against those groups who did not. Actually, if groups of *Homo sapiens* had not established property rights, then the chance that you would be reading what I have been writing about this topic would approximate absolute zero – as a species, we would have never moved beyond producing a basic spear.

Ultimately, all property can be traced back historically to the mixture of labor with natural resources - all property started out as *res nullius*, *terra nullius* or *data nullius*. (*Terra nullius* and *data nullius* will be discussed later in this chapter.) *Res nullius*, which translates to 'nobody's property', is the legal concept whereby objects which *can* be owned, but *are not* owned by anyone, either because no one has yet established ownership over them or because someone who previously had ownership over them, has lost or abandoned it. Assuming the *capture* or *extraction* criteria for establishing ownership (as this is the lowest standard to meet for ownership), this includes wild animals, but not killed or captured animals; the fruits of wild trees, but not those who are already plucked; wild flowers, but not plucked ones; wild vegetables, but not those unearthed; wild grains, but not those sliced off; random rocks laying around, but not rocks which have been transported or processed into specific products; the wood of wild trees, but not from trees who have already been felled by someone else; water in a sea, river or creek, but not water which is captured in a bucket or produced through a rain harvesting or purification system. Through legal accession, mixture, merger and amalgamation, labor and *res nullius* merged with each other into physical objects which were owned.

Subsequently, when someone attains ownership over some physical object, including its underlying natural resources, then he may do with his property as he wishes – including exchanging it for the services or for the property of others. Eventually, through voluntary exchanges – such as purchasing, bartering, betting, gifting, inheriting, legal compensation for damages or payment in kind or the running out of a statute of limitations for stolen property – all property, with its underlying natural resources, has transferred ownership to its present day owner.

In sum, this section has discussed the origins of ownership over physical objects. In the state of nature all natural resources start out as *res nullius*. They are nobody's property. Even though ownership is largely absent in the state of nature, among social animals, members of a group do have ownership over their labor. They can use this labor to perform services for other

members of their group in exchange for social currency. They can also use their labor to capture and extract natural resources from their surroundings and claim ownership over these physical objects. *Homo sapiens* is one of only a few animals who goes beyond this. He uses his labor not just to capture and extract natural resources from the surroundings, but he also manipulates and reconfigures them in ways which creates and produces additional, original value. Although thoughtful people can disagree on whether only capture and extraction - such as is found in non-human animals as well - establishes ownership or if also creation and production of additional, original value are required to establish ownership over the natural resources extracted or produced, there is little disagreement that the greater the value of the labor in relation to the natural resources, the stronger the claim to ownership will be. In the next two sections these principles will be applied not just to ownership over physical objects from *res nullius*, as discussed in this section, but also to ownership over land which was previously *terra nullius* and ownership over ideas which were previously *data nullius.*

5.3 From *Terra Nullius* to Ownership over Land

Although we have so far discussed the general principles that ownership comes from the admixture of one's labor with the natural resources in one's surroundings and that the greater the relative value of the labor compared to the value of the overall object and its constituent natural resources, the stronger the claim of ownership of the laborer will be, we have mostly discussed where ownership over specifically *physical objects* comes from. This section expands on these principles and applies them to *terra nullius* to deal with the moral and legal foundations for ownership over *land*. Section 5.4 will deal with the moral and legal foundations for ownership over *ideas.*

When we deal with ownership over land - whether private or public - we soon come across Rousseau, who, in his *Discourse on Inequality* (1755), has famously stated that:

> "*The first man who, having enclosed a piece of ground, bethought himself of saying This is mine, and found people simple enough to believe him, was the real founder of civil society. From how many crimes, wars and murders, from how many horrors and misfortunes might not any one have saved mankind, by pulling up the stakes, or filling up the ditch, and crying to his fellows, "Beware of listening to this impostor; you are*

undone if you once forget that the fruits of the earth, belong to us all, and the earth itself to nobody." [419]

He later expounded and elaborated on how to attain original ownership over land, as the right of first occupier, in his *The Social Contract* (1762) by stating that:

"In general, to establish the right of the first occupier over a plot of ground, the following conditions are necessary: first, *the land must not yet be inhabited*; secondly, *a man must occupy only the amount he needs for his subsistence*; and, in the third place, *possession must be taken, not by an empty ceremony, but by labour and cultivation*, the only sign of proprietorship that should be respected by others, in default of a legal title." [420] (emphasis added)

From Rousseau, we can distill three criteria which need to be fulfilled in order for original ownership to be established over a plot of land; 1. ownership can only be claimed over a plot of land which is not yet owned by anybody 2. ownership can only be claimed over a plot of land which is quantitatively necessary for subsistence 3. ownership can only be claimed over a plot of land which is qualitatively claimed by mixing one's labor with the land. These three criteria will be discussed in their respective order.

When it comes to the first criteria - original ownership can only be claimed over a plot of land which is not yet owned by anyone else - we hear echoes from the previous section which dealt with how to attain ownership over *res nullius*.[421] Similar to how *res nullius* refers to natural resources which belong to nobody, so it is with *terra nullius* as well - the former refers to *physical objects* whereas the latter refers to *land* which belongs to nobody. There are two parts to *terra nullius*; a private- and a public part.[422] The former refers to a wild, uncultivated

[419] *See* Rousseau, *Discourse on Inequality*, part II.
[420] *See* Rousseau, *The Social Contract*, Book I, part 9.
[421] *See supra* Section 5.2.
[422] *See* Rousseau, *The Social Contract*, Book I, part 9: "*We can imagine how the lands of individuals, where they were contiguous and came to be united, became the public territory*, and how the right of Sovereignty, extending from the subjects over the lands they held, became at once real and personal […] *It may also happen that men begin to unite one with another before they possess anything, and that, subsequently occupying a tract of country which is enough for all, they enjoy it in common, or share it out among themselves*, either equally or according to

land which is not owned by a private individual – the latter refers to a wild, uncultivated land which also does not belong to the larger public territory of a sovereign State.[423] For example, if through seismic activity a new island would be created in the middle of the Pacific Ocean which is in international waters and which hence does not belong to any sovereign State - as all land once did - then this island would be *terra nullius* both in the private- and in the public sense. If someone would venture to this island to cultivate the fertile volcanic soil and if he fulfills the other criteria for ownership over land as well (which we will discuss below), then the plot of land he has cultivated is no longer *terra nullius* in the private sense. However, the island at large is still a *terra nullius* in the public sense, given that there is no sovereign who can rightfully claim it yet. Only after a sufficient amount of cultivated plots of land on the island become united under a collective sovereign ownership, does the island at large lose its status as *terra nullius* in the public sense. Thoughtful people can disagree on the quantity and quality of cultivation which needs to take place in order to create common, public ownership among the inhabitants of the island over the island at large, but the criteria by which this is ultimately decided must, again, be the relation between the value which is created to the value which is extracted.[424]

The second criteria which needs to be fulfilled in order for someone to be able to claim original ownership over a plot of land is, according to Rousseau, that the plot of land which is claimed is quantitatively *necessary* for subsistence.[425] The essence of this criteria is its *necessity*.[426]Rousseau does not give us guidance however, as to what constitutes this necessity. He only gives guidance as to what is *un*necessary, namely, claims of ownership which are clearly disproportional.[427] For example, during the age of discovery in which Rousseau lived, it was not uncommon for Europeans who arrived on lands which were previously unknown to

a scale fixed by the Sovereign. However the acquisition be made, the right which each individual has to his own estate is always subordinate to the right which the community has over all: without this, there would be neither stability in the social tie, nor real force in the exercise of Sovereignty.". (emphasis added)

[423] *See* Rousseau, *The Social Contract*, Book I, part 9.

[424] *See generally supra* Section 5.2. The remainder of Section 5.3 will also discuss this principle.

[425] *See* Rousseau, *The Social Contract*, Book I, part 9.

[426] *See* Rousseau, *The Social Contract*, Book I, part 9: "Every man has naturally a right to everything he needs; but the positive act which makes him proprietor of one thing excludes him from everything else. *Having his share, he ought to keep to it, and can have no further right against the community.* […] How can a man or a people seize an immense territory and keep it from the rest of the world except by a punishable usurpation, since all others are being robbed, by such an act, of the place of habitation and the means of subsistence which nature gave them in common?". (emphasis added)

[427] *See* Rousseau, *The Social Contract*, Book I, part 9.

other Europeans, to plant a flag and declare it as their own, regardless of earlier inhabitants.[428] As such, when the Dutch seafarer Abel Tasman arrived at the northern seacoast of *Terra Australis* (translation: "Southern Land"), in 1644, he had little hesitation to name it *Nieuw Holland* (translation: "New Holland", today: "Australia"), despite the fact that not only did the Dutch not cultivate or settle the land, they had not even mapped the entire coastline of this 6th largest landmass in the world.[429] Taking the logic of this method of claiming ownership over land to its extreme, this would mean that the first person who moved out of Africa missed out on a great opportunity for not pointing at the Eurasian landmass and claiming it as the property of him and his offspring.[430] It is clear and understandable why Rousseau opposes such claims of blatantly disproportionate ownership.

However, excluding just the extremes does not help us understand what constitutes "*[an] amount he needs for his subsistence*".[431] In order to understand Rousseau here, it is again important to understand the historical context in which he lived. Not only did Rousseau live during the age of discovery, but it was also the time of the third agricultural revolution in Great Britain (17th-19th century), which saw an unprecedented increase in agricultural productivity, and at the outset of the first industrial revolution in Great Britain which was enabled by this increase in agricultural productivity. At the time of Rousseau nearly all people were still subsistence farmers, meaning they produced enough food to feed most of the members of their families most of the time and that possibly, sometimes, they produced a little surplus which they could exchange for some special products. It seems unlikely that Rousseau opposed this lifestyle for its disproportionate claims on property, rather than for its extreme poverty. It seems more likely that Rousseau opposed the royal claims of ownership which sovereigns made at the time, regardless of the concerns of their subjects. Indeed, throughout his chapter on real property Rousseau criticizes sovereigns for the grand claims of ownership they make over land, not only for the above mentioned claims of ownership over land which were part of the age of discovery and which were made regardless of the concerns of earlier inhabitants, but also for

[428] *See* Rousseau, *The Social Contract*, Book I, part 9: "*Is it to be enough to set foot on a plot of common ground, in order to be able to call yourself at once the master of it?* Is it to be enough that a man has the strength to expel others for a moment, in order to establish his right to prevent them from ever returning?". (emphasis added)
[429] Admittedly, neither the Netherlands nor the V.O.C. actually claimed the land as its own.
[430] *See* Rousseau, *The Social Contract*, Book I, part 9: "When Nunez Balboa, standing on the sea-shore, took possession of the South Seas and the whole of South America in the name of the crown of Castile, *was that enough to dispossess all their actual inhabitants*, and to shut out from them all the princes of the world?". (emphasis added)
[431] *See* Rousseau, *The Social Contract*, Book I, part 9.

their claims of ownership on the lands on which their own citizens lived.[432] Contrary to earlier monarchs, Rousseau observes, monarchs at the time of Rousseau were not the kings of the *peoples* over which they ruled, but rather, they were the kings of the *lands* on which the people lived over whom they ruled.[433] Also, it must be noted that the reason most subsistence farmers did not own land beyond their most basic necessity, was not due to a lack of *willingness* to cultivate more land, but because of a lack of a *capability* to do so. As we can see from subsistence farmers from large parts of the developing world in Africa, Asia and Latin America, there is only so much land one family can farm by letting a beast of burden pull a plow.

This brings us to the third criteria for establishing ownership over land; ownership can only be claimed over a plot of land which is qualitatively claimed by mixing one's labor with the land.[434] Here we hear the echoes from Locke. As explained in the previous section, the reason why mixing one's labor with natural resources creates ownership when the amount of labor stands in sufficient relation to the rest of used resources, is because additional, original value has been created. Since the new physical object– which is created by applying labor to natural resources – can no longer be separated from its original natural resources, it subsumes the value of these resources into the new property.

The same is true for ownership over land and agricultural output.[435] The fruits of a land can belong to everyone, when they are produced by nature, or they can belong to a man, when they are produced by him.[436] When he clears the land from wild growth and keeps fighting back against nature which always tries to reclaim it, when he toils and tilts the land and when he sows and fights off pests large and small, when he waters and feeds his crops so they may grow,

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[432] *See* Rousseau, *The Social Contract*, Book I, part 9. 'Real property' comes from English common law and refers to property over immovable objects – such as land and build structures.

[433] *See* Rousseau, *The Social Contract*, Book I, part 9: "The advantage of this does not seem to have been felt by ancient monarchs, who called themselves Kings of the Persians, Scythians, or Macedonians, and seemed to regard themselves more as rulers of men than as masters of a country. *Those of the present day more cleverly call themselves Kings of France, Spain, England, etc.: thus holding the land, they are quite confident of holding the inhabitants*.". (emphasis added)

[434] *See* Rousseau, *The Social Contract*, Book I, part 9: "possession must be taken, not by an empty ceremony, but by labour and cultivation […].".

[435] *See* Locke, *Second Treatise of Government*, Chapter 5, section 40: "*Nor is it so strange, as perhaps before consideration it may appear, that the property of labour should be able to over-balance the community of land*: for it is labour indeed that puts the difference of value on every thing; and let any one consider what the difference is between an acre of land planted with tobacco or sugar, sown with wheat or barley, and an acre of the same land lying in common, without any husbandry upon it, and he will find, that the improvement of labour makes the far greater part of the value.". (emphasis added); *see also* Rousseau, *On the Inequality among Mankind*, Part II: "for what else can a man add to things which he does not originally create, so as to make them his own property? *It is the husbandman's labour alone that, giving him a title to the produce of the ground he has tilled, gives him a claim also to the land itself*, at least till harvest, and so, from year to year, a constant possession which is easily transformed into property.". (emphasis added)

[436] *Id.*

when he protects them from wildfires and hailstorms so they won't be destroyed, then he and he alone may reap the fruits of his labor and he may claim these fruits as his own, as he is their Creator.[437] Consequently, somewhere along this line of activities, his addition of value to this land will be great enough for him to ward off others from the land and to say: "this land here, this land I have built, this belongs not to all, but to me alone, now hurry along before I have the right to defend this property.".[438]

Again, it is important to reiterate and to emphasize that this is only the case when the newly created value stands in great enough proportion to the value of the natural resources which have been withdrawn from the use by others.[439] This can be the case when a little labor is added to natural resources which are abundant and which have little value by and of themselves, such as when someone takes sand and water and turns it into the cement or bricks needed to build a house. However, it is also possible to attain ownership when a lot of labor is added to natural resources which are rare and have much value by and off themselves, such as with basic diamonds when they receive a 'brilliant cut'.[440] Actually, it is only quite recently that Mankind has started treating certain commodities as sufficiently rare to make their value to the common rise to such proportions that we require much labor to attain ownership over the extraction of these resources. Previously, when gold was discovered in this or that country, people were invited to rush in and dig it out of the ground or to sift it out of a river. Similarly with ownership over land, it is only recently that we have started to treat it as a rare commodity,

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[437] *Id.*

[438] *See* Locke, *Second Treatise of Government*, Chapter 5, section 32-33: "But the chief matter of property being now not the fruits of the earth, and the beasts that subsist on it, but the earth itself; as that which takes in and carries with it all the rest; *I think it is plain, that property in that too is acquired as the former. As much land as a man tills, plants, improves, cultivates, and can use the product of, so much is his property.* He by his labour does, as it were, inclose it from the common. Nor will it invalidate his right, to say every body else has an equal title to it; and therefore he cannot appropriate, he cannot inclose, without the consent of all his fellow-commoners, all mankind. God, when he gave the world in common to all mankind, commanded man also to labour, and the penury of his condition required it of him. *God and his reason commanded him to subdue the earth, i.e. improve it for the benefit of life, and therein lay out something upon it that was his own, his labour.* He that in obedience to this command of God, subdued, tilled and sowed any part of it, thereby annexed to it something that was his property, which another had no title to, nor could without injury take from him." (emphasis added)

[439] *See* Locke, *Second Treatise of Government*, Chapter 5, section 40: "*I think it will be but a very modest computation to say, that of the products of the earth useful to the life of man nine tenths are the effects of labour*: nay, if we will rightly estimate things as they come to our use, and cast up the several expences about them, what in them is purely owing to nature, and what to labour, we shall find, that *in most of them ninety-nine hundredths are wholly to be put on the account of labour*." (emphasis added)

[440] The value of a diamond is assessed by 4 C's; color (the rarer the color, the more valuable it is), clarity (the clearer the diamond, the more valuable it is), carat (the larger the diamond, the more valuable it is) and cut. The cut is better the more it conforms to one of six mathematically calculated proportions which maximize brilliance (how light bounces around in the stone), fire (how the stone produces colors from white light) and scintillation (how the stone sparkles when moved around). The better a diamond is cut in such a way that it maximizes brilliance, fire and scintillation, the more value has been added to it.

especially within cities. Previously, it was only in places such as the Jewish Ghetto in Venice that land was so scarce that people started building up vertically, rather than building out horizontally. Thus, for the largest part of human history, ownership over land was established simply by adding one's labor to land which was previously *terra nullius*.

5.4 From *Data Nullius* to Ownership over Ideas

Besides ownership over physical objects and land, as discussed in the previous sections, Man can also own ideas. After all, pursuant to the principle which has been set out in Section 5.2, when one adds value to natural resources and when this added value stands in sufficient proportion to the overall value, then ownership is established, including over the natural resources underlying it. In the previous sections this principle has been applied to *res nullius* and to *terra nullius* to establish ownership over physical objects and land, respectively, including over the natural resources contained in these produced products and produced land. When one uses manual labor on a stick to turn it into a spear and when one uses manual labor to turn natural land into agricultural pastures, then one attains ownership over these physical properties.

In this section, I will argue that the same is true for specific ideas on how to make better use of *res nullius* and *terra nullius*. In other words, this section deals with mental labor. As discussed in Section 5.2 fruits, vegetables, grains and animals which are captured or produced, are subsequently owned by their captor or producer (depending on the level of labor which one deems sufficient to establish ownership), because he had mixed his labor with these natural resources. One can however also domesticate and breed a specific species of fruit, vegetable, grain or animal. In such cases he does not just own the physical animals, fruits, vegetables and grains, but also their artificially selected for design. In other words, he owns not just the *objects* themselves, but also the *idea* behind them. There are several reasons for why this is the case. One is the reasoning we have seen in the previous sections; one is rewarded for mixing his manual labor with natural resources. After all, it takes an incredible amount of physical work to domesticate and breed such fruits, vegetables, grains and animals. If someone would steal such a species of fruit, vegetable, grain or animal and uses it for his own breeding purposes, then the damages to the original breeder are far greater than the damage of the loss of the single specimen. After all, he might have spent his entire life breeding this particular species. Again,

for ownership over ideas as well, it is also not clear here how much labor has to be exercised to be able to claim ownership over it. Thoughtful people can disagree.

However, it seems that ownership over intellectual property is of a different kind than ownership over physical objects or over land and that such an emphasis on manual labor is misplaced. Contrary to ownership over objects and land, determining whether someone attains ownership over an intellectual resource is not entirely determined by the amount of *manual* labor applied directly for the *manipulation* of the natural resources. Instead, ownership over ideas is attained more by the amount of *mental* labor one has undertaken over how to *combine* natural resources in a useful way. In other words, ownership over ideas deals not with the *extraction* or *manipulation* of *material*- and/or *energy* resources, but it deals with the *discovery* of *information* resources.

Consider the universe from God's perspective. The universe contains material- and energy resources and within the laws of physics, there exists a range of possible ways for these natural resources to be manipulated and combined. This range, one can imagine, is incredibly large and only a small fraction of these combinations is useful to Mankind. Within rocks exists the possibility to subtract material until one is left with flint stones which can serve the purpose of hunting, cutting, slicing, fighting or other; within certain wild animals, and plants exists the possibility to feeding and clothing us, or, if domesticated, to serve for the purpose of transporting, laboring, protecting, accompanying us or other; within land as nature left it, exists the possibility to cultivate land which can sustain entire civilizations. Within such manipulation of a single natural resource, there is however a myriad of other useful possibilities as well. Rocks, animals- and plant species can also be disassembled to serve as basic resources for the construction of tools and structures - such as needles made from bones for sowing clothes, concrete made out of stones for building bricks and wood made of trees for building the skeletons of houses.

The possibilities for manipulation depend greatly on the resources used and on the manipulation method used. Within the resources used there are certain possibilities and restrictions. For example, even though the resources *Equus quagga* (*i.e.* the zebra) and *Equus caballus* (*i.e.* the horse) seem very similar, only within the resource *Equus caballus* exists the possibility for domestication through the manipulation method of artificial selection.[441]

[441] *See* J. Diamond, *Guns, Germs and Steel* (1997). Diamond lists six features which a wild animals needs to have in order to enable domestication; 1. they cannot be picky eaters 2. they have to reach maturity fast enough to enable breeding for useful features within a human lifespan 3. they must be willing to breed in captivity, which excludes

However, access to the full range of possible manipulations of a certain resource increases when additional manipulation methods are used. For example, through artificial selection alone, the Dutch could take the root vegetable *Daucus carota* (*i.e.* the carrot) and breed it to contain a sufficient amount of beta-Carotene to turn it orange, so that they could honor the 'father of their fatherland', Willem de Zwijger (*i.e.* Willem of Orange). However, if we expand the list of manipulation tools with genetic engineering, then one could assume that the Dutch could have also turned the resource *Daucus carota* red, white and blue, to reflect the Dutch flag. In other words, the range of possibilities for the manipulation of a natural resource is dependent upon the resource used and upon the manipulation methods employed.

Additionally, on a meta-level, manipulation methods - such as artificial selection and genetic manipulation - are, by and off themselves, rare useful ideas within the full range of possibilities for the manipulation of plant- and animals species. Other such methods which are possible, but not useful, range from Lamarckism to Lysenkoism. Additionally, through the manipulation and combination of resources, we can also discover ideas through which entire new worlds of data and information resources open up to us. For example, through the manipulation of sand we have discovered how to create glass. In the temporal sense, glasses have allowed for an effective doubling of the age during which Mankind – whose eyesight decreases with age -, can continue to perform skilled work. In the spatial sense, through microscopes and telescopes, we have discovered entire new universes, small and far.

Within the laws of physics there also exists a broad range of possibilities for how natural resources cannot just be manipulated, but also *combined* with other natural resources. Some of the most significant combinations for Mankind include the combination and manipulation of a flint and kindling to create fire; a stick and stone to create a better spear; a horse and saddle to create better means of transportation and logistics; and paper and charcoal to write down letters, words and ideas. Moreover, such useful combinations can also again be combined with other useful combinations such as the saddled soldier with spear in hand or the computers we have on our desks, in our bags and in our hands. In other words, not only can natural resources be manipulated and combined with other natural resources, but they can also be combined with (other) information resources as well.

territoriality 4. they must be docile by nature (horses and cows comply with this requirement, but zebras and African or American buffalo do not) 5. they cannot have a strong tendency to panic and flee 6. they should preferably be social and conform to a social hierarchy where humans can place themselves on top.

Natural resources – such as material- and energy resources – can be manipulated and combined with each other and with (other) information resources. This enormous range of possibilities for the manipulation and combination of natural resources - such as material- and energy resources - with each other and with (other) information resources, means that statistically, if we left it to chance, we should only be coming up with bad ideas. After all, the overwhelming majority of possible combinations are entirely useless. When an inventor tries to invent a new product or service, through the scientific process of hypothesis and testing, laborious trial and error, what he does, from God's perspective, is that he tries out some of these possible combinations in order to find out which of them have some use to Mankind. He takes them out of the world of meta-physical possibility and brings them into the world of physical reality. In other words, only through labor - albeit perhaps the mental kind in the laboratory or at the office, as opposed to the manual kind at the agricultural field or in the factory - does one bring these information resources out of the natural world and bring them into the realm of Mankind. It is as if *Homo sapiens*, which translates from Latin to 'wise man', is plucking a piece of fruit from the tree of wisdom.

Henceforth, I will refer to the entire range of possibilities for the manipulation and combination of natural resources as *data*. The useful possibilities I will refer to as *information*. Its discovery or extraction from nature can be owned.

Just as with *res nullius* and *terra nullius*, this laborious process starts with a bare, raw resource. I will call this resource *data nullius*, which, insofar as I can tell, is a term of my invention. I define it analogous to *res nullius* and *terra nullius*. It is the basic resource in the world of information before it is claimed and extracted from the natural world. For example, there exists data about the amount of forests in a tree, the nutrients in an agricultural land and the migration patterns of fish, but just as with wild animals, this data only becomes useful when it is *captured* and *extracted* from the natural world and stored on a storage device – such as paper, hard disks or in the cloud. It only becomes an information resource which can be claimed and owned when it is brought under one's control.

Again, some could argue that the mere capturing of data from the natural world through sensors gives one ownership over this data and that it therefore constitutes information, analogous to the capturing of a wild animal which had previously been a res nullius.[442] Others might argue that this is still mere raw data - analogous to land and other natural resources the

[442] *See generally supra* Sections 5.2, 5.3.

way nature has left them - and that this data first needs to be processed before a claim of ownership can be made.[443] What is clear however is that the more value is added by the inventor, the stronger his claim to ownership will be. The more one discovers about the reality of the physical world, the more the discoverer can claim ownership over his discovery.[444]

Subsequently, just as with natural resources, when it is extracted from the natural world, this data or information (depending on your view) can be manipulated and combined with other information resources to extract more useful information about the way the natural world works. For example, the modern farmer can cross-reference data about the output of agricultural fields over different years with the levels of nutrients, rainfall and pests during those years. After analyzing this data, the farmer might discover how to optimize these levels through inputs such as fertilizer, water and pesticide in order to increase the yields of his fields. Ideally, this modern farmer would turn his fields into a laboratory where he constantly runs multiple experiments at the same time. Through the scientific process of hypothesis and testing, laborious trial and error, the modern farmer innovates quickly and keeps trying to discover new, more useful ways to combine his inputs to create qualitatively and quantitatively better outputs.

One analogy which is commonly used to describe this process of exploration is that of mining. In this analogy, there is a data mine, similar to mines for precious natural resources, which is being mined for a precious natural resource - such as gold, the ultimate symbol of power. For example, in a modern goldmine, there might be 3.5 grams of gold per tonne of earth on average. In order to extract the few valuable nuggets of gold, the earth needs to be laboriously extracted and processed. Analogously, the same is true for data mines. In order to find the few valuable nuggets of information, one needs to extract data from the natural world through censors or through running trial and error experiments, and subsequently process the data by replacing, modifying or deleting incomplete, incorrect, inaccurate or irrelevant parts of the data and analyze it so that we can discover useful ideas. To bring the analogy of data as a gold mine full circle, in 2000 Rob McEwan, CEO of Goldcorp Inc. set up the Goldcorp Challenge.[445] Goldcorp posted all of its data about an underperforming gold mine in Canada online and challenged the world to come up with the best ideas on where to find the next six million ounces

[443] *Id.*
[444] *Id.*
[445] *See e.g.* P. Diamandis, S. Kotler, *Abundance* (2012), p. 77-84; *see also* Open Innovation: Goldcorp Challenge, Idea Connection, 22th October, 2009 (hereinafter: "Goldcorp challenge), *available* at: https://www.ideaconnection.com/open-innovation-success/Open-Innovation-Goldcorp-Challenge-00031.html (accessed on 31st July, 2017).

of gold in this mine.[446] Ideas were submitted from all over the world.[447] The winning team was a team from Australia of mathematicians which had never visited the mine in Ontario, but simply processed the data which had been extracted and posted online by Goldcorp.[448] The result of the challenge was an estimated three billion dollar profit for the gold mining company.[449] The prize money was a negligible half a million dollars, less than the cost of most physical gold mining machines.[450] Goldcorp could have chosen to physically extract and process mountains worth of earth, but it was far more lucrative to mine mountains of data instead. Moreover, this was not a one off event. Modern day gold mining is heavily into data mining. For example, Barrick Gold Corp., the world's largest gold miner has partnered with Cisco Systems, Inc., the largest networking company in the world, to 'take gold mining into the digital era'.[451]

Besides gold mining, we see that data mining helps us discover tremendous amounts of value of Mankind. Broadly speaking, there are two main ways in which information resources add value to Mankind; they can help create more of the same or they can create something entirely new. I will discuss them in their respective order.

Information resources are probably best known for their addition of value to Mankind by helping Mankind to do more of the same with the same amount of material and energy resources. A common misconception about the economy is that it is a zero-sum game. Just as with (agricultural) land, as discussed in the previous section, the assumption is that we will run out of other natural resources as well. Besides material- and energy resources however, as discussed, it is also possible to increase the amount of functional benefit we can have from the available material- and energy resources through information resources. In other words, even if there are limits in the absolute existence of material- and energy resources – which there certainly are - information resources can often mostly compensate for this limitation. Ramez Naam describes the different ways in which information resources can compound the functional benefit we have from natural resources. He distinguishes what he refers to as substitutes, reducers and recyclers.[452] The most striking example I have come across which can help

[446] *Id.*
[447] *Id.*
[448] *Id.*
[449] *Id.*
[450] *Id.*
[451] *See e.g.*, D. Bochove, D. Bass, Barrick Turns to Cisco to Drag Gold Mining Into Digital Era, Bloomberg, 12th September, 2016, *available* at: https://www.bloomberg.com/news/articles/2016-09-12/barrick-turns-to-cisco-to-drag-dusty-gold-mines-into-digital-era (accessed on 31st July, 2017).
[452] *See generally* Naam, *The Infinite Resource*, Chapters 9-11.

illustrate the importance of information resources to increase the availability material- and energy resources, is the availability of water, the most basic resource of all biological life, in the State of Israel. When the modern State of Israel was being re-established in the late 19th century, one of the problems which was quickly realized, was the lack of natural water resources. If the Jewish nation was to re-establish itself as a State in its historical homeland after nearly two millennia of exile, then the early Zionists would have to find ways to increase the functional benefit they could have from the water resources there. In his book, *Let There Be Water* by Seth Siegel, describes how the early Zionists created water almost (and sometimes literally) out of thin air.[453] We see the reducers, recyclers and substitutes from Naam all at play here.[454] The *reducer* refers to the more efficient use of a particular resource.[455] In the case of water in Israel, this can be clearly seen with the invention there of modern drip irrigation. Drip irrigation allows for targeted irrigation of crops, as opposed to flooding or spraying entire fields, which, when compared to drip irrigation, wastes more than 90% of the water used.[456] This simple invention thus increased the amount of crops which could be grown with the same amount of water by 10x without adding a single extra drop of water.[457] The *recycler* performs a similar functional improvement. It refers to the reuse of a specific resource in a waste stream.[458] Through a myriad of inventions Israel has become the No. 1 water recycler in the world, at a rate of over 90%.[459] By comparison, the No. 2 in the world is Spain, which recycles less than 20% of its water.[460] Again, we see that through recycling, the same amount of fresh water could increase the availability of water resources by about 10x. The *substitute* refers to a resource which provides an alternative resource base to use to perform a certain function.[461] In the case of Israel and water, this one blows it out of the water, literally. Although fresh water is irreplaceable as a way to keep our bodies' and our plants' cells hydrated, here too Israel found ways to use information resources to compensate for a lack of natural resources. Through the invention of efficient desalination technology, Israel now uses the salty water of the Mediterranean Sea to create the majority of the fresh water used in its cities.[462] Moreover, Israel expects to produce 90% of its water within a decade, for again, another 10x improvement on

[453] *See generally* S. Siegel, *Let There Be Water: Israel's Solution for a Water-Starved World* (2015) (hereinafter: "Let There Be Water").
[454] *See generally* Naam, *The Infinite Resource*, Chapters 9-11.
[455] *See generally* Naam, *The Infinite Resource*, Chapter 10.
[456] *See generally* Siegel, *Let There Be Water*, p. 55-77.
[457] *Id.*
[458] *See generally* Naam, *The Infinite Resource*, Chapter 11.
[459] *See generally* Siegel, *Let There Be Water*, p. 78-99.
[460] *Id.*
[461] *See generally* Naam, *The Infinite Resource*, Chapter 9.
[462] *See generally* Siegel, *Let There Be Water*, p. 42-54.

the use of this precious resource.[463] The fresh water lakes, rivers and the underground aquifers no longer need to be tapped to satisfy fresh water demands. Moreover, although the reducer, recycler and substitute in the case of Israel's water example each create about a 10x improvement in the availability of water resources, their effects compound. In other words, in little over a century Israel has managed to provide a 1000x improvement on the availability of its fresh water needs from the same set of fresh water resources.

What is true for water resources in the case of Israel, is true for most material- and energy resources. Increasing scarcity in the absolute amount of material- and energy resources which can still be mined is offset by the increase in the information resources which help us increase the functional use we have from these physical resources at a faster rate than we deplete them. One famous example is the Simon-Ehrlich wager. During the 1960s and 1970s biologist Paul Ehrlich, became widely cited for his book *The Population Bomb* which warned that the high population growth at the time would soon cause Mankind to outgrow the carrying capacity of the planet.[464] Ehrlich advocated in favor of population control to avoid a Malthusian catastrophe. The economist Julian Simon, in his book *The Ultimate Resource* argued that this time too, Malthusian warnings would prove to be a fallacy and that information resources would compensate for material- and energy resources.[465] Simon challenged Ehrlich to put his money where his mouth is and proposed a wager of $10.000,- to Ehrlich; Ehrlich could choose a basket of raw materials and a date more than a year away, and the two would wager on whether or not inflation-adjusted prices would have increase for these commodities, as suggested by Ehrlich.[466] Ehrlich chose copper, chromium, nickel, tin and tungsten and, just to be sure, a date ten years away from the start of the wager.[467] When the payoff date came in 1990, Ehrlich had a decisive loss of the wager as the prices of all five commodities had fallen dramatically.[468] Ehrlich declined to accept a second proposed wager by Simon.[469]

Clearly, natural resources are finite, but our access and use of them, through our resourcefulness, or information resources, is far less so. Given that so far, we have managed to

[463] *Id.*
[464] *See generally* P. Ehrlich, *The Population Bomb* (1968).
[465] *See generally* J. Simon, *The Ultimate Resource* (1981).
[466] *See* Naam, *The Infinite Resource*, Chapter 2.
[467] *Id.*
[468] *See* Naam, *The Infinite Resource*, Chapter 2.
[469] *Id.*

consistently increase the functional availability of every resource faster than we have managed to deplete them, perhaps appropriately, Ramez Naam refers to ideas as the *infinite resource*.

Besides helping us do more of the same, as discussed above, information resources can also help us create entirely new products and services. For example, although the best restaurants in the world certainly use the best products and have the best equipment to prepare the products and services they sell to their customers, the greatest increase in value for these dishes and dining experiences comes from the way they put all of these together. When one visits a Michelin star restaurant, one will notice that the price of the food cannot just be explained by adding up the costs for the natural resources (ingredients, cooking gas), labor (marketing, production costs and entrepreneurship) and capital (restaurant building, décor, training of chefs). Rather, one will find that a large share of the price is made up of the cost of the creation of the recipes used (the intellectual resources). These chefs have used their extensive training and knowledge as well as a lot of scientific process of hypothesis and testing, laborious trial and error, to come up with recipes which have the right contrasts of flavors between sweet, sour, salty, bitter and umami, of a texture which has the right balance between a firm bite and soft mouthfeel and between dry-, and juiciness. Additionally, the recipe also needs to be visually appealing, containing nicely contrasting bright colors not usually found on plates – such as greens, purples and yellows. Speaking of plates, some of the more post-modern expressions of food go far beyond transportation devices for food, but have become entire experiences all onto themselves - such as with edible floating balloons made from cheese.[470] Every part of the recipe needs to be surprising and delightful. It is science. It is art. It is originally created value.

The reason one can own an information resource such as a specific recipe, is because someone has added great value to the ingredients through their combination. Perhaps aptly phrased, resourcefulness does not refer to the amount of resources accumulated, but to the ingenuity in how to use them. As Chief Economist of the World Bank, Paul Romer, has remarked; “Economic growth occurs whenever people take resources and rearrange them in ways that are more valuable.”.[471] The potential size of information resources vastly exceeds the value of natural resources. Moreover, with the upcoming internet of things and the internet of everyone, as discussed in Section 2.4, mountains of data about the natural world and about

[470] Alinea Restaurant, 1723 N Halsted St, Chicago, IL 60614, USA, 3 Michelin stars.
[471] P. Romer, Compound Rates of Growth, *available* at: http://www.econlib.org/library/Enc/EconomicGrowth.html (accessed on 31st July, 2017).

human nature can now, for the first time ever, be extracted and processed, through a scientific process of hypothesis and testing, laborious trial and error, to come to the few nuggets of valuable information resources about how the natural world works. It will allow us to combine bytes with atoms to improve everything about our physical world, such as agriculture, forestry, fishing, drilling, mining, construction, manufacturing, professional services (legal, financial, tax, accounting and business consultancy), support services (human resource management and facility management), customer relationship management (public relations, marketing, sales and customer support), healthcare services (physical- and psychological), trade and retail, logistics, energy, (information and) communications technology, media and entertainment, art and design, education, public services and leisure (hospitality and wellness).

Through the extraction, and processing of more and more information about the physical world, we will cast a nervous system over our fields, forests and fisheries, we will overlay data mines over our oil fields and mineral mines and create a cornucopia of abundance; we will construct and manufacture structures and products with robots and artificial intelligence in a way which will make our construction and factory workers look absolutely superhuman; we will correlate human nature and nurture with diseases and banish diseases which right now scare us to death; we will have experiences physical and digital which are so perfectly tuned to our human nature and personal tastes, likes and preferences that they positively amount to bringing us heaven on earth.

However, all of this is predicated on the successful protection through which we can continue to be incentivized to make a living from producing all of this intellectual property.

In the agricultural and industrial ages, we used to explore and exploit material- and energy resources. This exploration has now largely been finished. Although there will be some anecdotal examples, we are not going to find another pool the size of the natural resources we have now. Moreover, until we manage to make space mining cost/effective, we will have to make do with the natural resources on this planet only. Fortunately, for the foreseeable future, we can do so, easily. In the information age, we will explore and exploit information resources instead. We will not find more *of* the same. We will do more *with* the same and we will do altogether new things.

Concomitantly, as the economy moves from the primary and secondary sector to the tertiary sector, the political importance of protecting the economic end products of the primary

and secondary sector - which are mostly added value *res nullius* and *terra nullius* - declines.[472] As the relative share of material- and energy derived economic activity declines in favor of information based economic activity, in a way that can only be compared with the decline of agriculture in favor of industry and the service sector, then one of the most fundamental tasks of a government, protecting property, should pivot correspondingly. The task of the State should increasingly change to not just be concerned with the protection of just air-, water-, terrestrial-, and outer space - which correspond with material- and energy resources -, but especially also with the protection of the space in which information resources are being captured, processed and transmitted. As value is mostly being produced not in physical space, but in cyberspace, States will need to respond to large-scale theft of this produced value in the same way as they would traditionally respond to theft of the land where its people live and work. In other words, States should increasingly expand their definition of territorial integrity to not just include the *physical* spaces where their citizens live and work, but also to include the *non-physical* cyberspace. Only if they can effectively protect their citizens' lives and livelihoods in this new cyber territory can they maintain their *raison d'être*. Therefore, the more a State's economy moves into cyberspace and the larger the scale of the theft of intellectual property, the more severe the effects of this theft become and therefore, the more likely it is that a State will consider such theft as aggrandizement of cyber territory.

5.5 Conclusion

This chapter started with the observation that in the information age, our economic activity is moving away from the types of economic activity which correspond to the primary and secondary sector of the economy, namely land and physical labor, to the types of economic activity which corresponds to the tertiary sector, namely mental labor and capital. Resultantly, the State needs to adjust accordingly and protect the new types of property we produce if it wants to maintain its *raison d'être.*

Section 5.2 has set out the concept of property on the most basic level. It has argued that among social animals, members of a group have ownership over their own labor. Even without the exchange of products or physical currency in exchange for labor, there is the evolved understanding that social currency exchanges owner in exchange for the value created through labor. This social currency can either be cashed in on at a later date, or, alternatively, there is a

[472] *See supra* Section 2.4.

political or social cost to pay. In this section, we have also focused on one particular species of social animal; *Homo sapiens*, because unlike nearly any other animal, we have the peculiar attribute of using our labors to turn *res nullius* into finished products.

Section 5.3 applied the principles of ownership as discussed in Section 5.2 to land and has described how a moral claim of ownership over land comes into existence. Here too, we have seen that the creator of new value becomes its rightful owner, in this case by cultivating *terra nullius* into agricultural land. The fruits of such a land are not those from nature, but those from labor and as such, they are his and his alone.

Section 5.4 applied these same principles to the information age. In the information age, value is increasingly added not by extracting more materials or producing them further into higher end products, but rather, by capturing, processing and transmitting *data nullius* into information resources. We are increasingly producing value not by creating products or lands, but by discovering ideas about the way the natural world works. Making a living in the Information Age thus entails creating intellectual property by cultivating and structuring parts of the data world. In this section, we have also discussed the consequence of this shift in importance towards the creation of intellectual property as it pertains to our social organization, namely, that the State can only maintain its *raison d'être* so long as it continues to protect our property. Therefore, as our economic activity continues to move into the domain of cyberspace, the State will follow us there and will start to consider large-scale theft of our intellectual property in this space as severe as aggrandizement of its (cyber) territory.

Councillor Hamann*: Care for some company?*

Neo*: Councillor Hamann.*

Councillor Hamann*: I don't want to intrude if you prefer to be alone.*

Neo*: No, I could probably use some company.*

Councillor Hamann*: Good, so could I. It's nice tonight. Very calm. Feels like everyone's sleeping very peacefully.*

Neo*: Not everyone.*

Councillor Hamann*: I hate sleeping. I never sleep more than a few hours. I figure I slept the first 11 years of my life, now I'm making up for it. What about you?*

Neo*: I just haven't been able to sleep much.*

Councillor Hamann*: It's a good sign.*

Neo*: Of what?*

Councillor Hamann*: That you are, in fact, still human. Have you ever been to the engineering level? I love to walk there at night, it's quite amazing. Would you like to see it?*

Neo*: Sure.*

[…]

Councillor Hamann*: Almost no one comes down here, unless, of course, there's a problem. That's how it is with people - nobody cares how it works as long as it works. I like it down here. I like to be reminded this city survives because of these machines. These machines are keeping us alive, while other machines are coming to kill us. Interesting, isn't it? Power to give life, and the power to end it.*

Neo*: We have the same power.*

Councillor Hamann*: I suppose we do, but down here sometimes I think about all those people still plugged into the Matrix and when I look at these machines, I.. I can't help thinking that in a way, we are plugged into them.*

Neo*: But we control these machines, they don't control us.*

Councillor Hamann*: Of course not, how could they? The idea's pure nonsense, but... it does make one wonder just... what is control?*

Neo*: If we wanted, we could shut these machines down.*

Councillor Hamann*: Of course... that's it. You hit it! That's control, isn't it? If we wanted, we could smash them to bits. Although if we did, we'd have to consider what would happen to our lights, our heat, our air…*

Neo*: So we need machines and they need us. Is that your point, Councillor?*

Councillor Hamann*: No, no point. Old men like me don't bother with making points. There's no point.*

Neo*: Is that why there are no young men on the Council?*

Councillor Hamann*: Good point.*

Neo*: Why don't you tell me what's on your mind, Councillor?*

Councillor Hamann*: There is so much in this world that I do not understand. See that machine? It has something to do with recycling our water supply. I have absolutely no idea how it works. But I do understand the reason for it to work. I have absolutely no idea how you are able to do some of the things you do, but I believe there's a reason for that as well. I only hope we understand that reason before it's too late.*[473]

[473] The Matrix Reloaded (2003), part 3.