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The legal status of co-generated data

with particular focus on the ALI-ELI Principles for a Data Economy and the rules on accession, commingling and specification

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A major problem when trying to resolve questions surrounding the legal status of data is how it should be defined, classified and specified. How to create a legal object, in the stricter sense of an object as to which a subject may claim a right against a considerable and relevant group of other subjects, out of the continuous flow of streams, activities, services that define data? Legal objects tend to be static, such as a house or a car, but a flow by its very nature is dynamic. When data emanate from different sources (co-generared)in the sense that more than one party can be said to have (somehow) contributed to its generation things become even more complex. This contribution aims to shed some light on how longstanding principles of (among others) Dutch, German and Belgian property law could prove useful in finding a way to regulate the use of and access to co-generated data.

1. Introduction

1.1 The difficulty of capturing data as legal objects

A major problem when trying to resolve questions surrounding the legal status of data is how it should be defined, classified and specified. By defining we mean making a statement regarding the meaning of a term, classification refers to arranging data in classes following particular criteria, specification means delineating data such that both between parties to a contract ('*inter partes*' or bilaterally) and to a considerable and relevant group of third parties (multilaterally) it is clear which data is referred to. The latter of these three steps is needed to accept data as a legal object that can be 'controlled' in the sense of managed. Management here means that the data can be accessed, used, ported, excluded, transferred and deleted.[1]

Although data is of great economic value, as long as it cannot be demarcated properly, the law has serious problems creating a framework for governing data transactions as for example data trade and the creation of security rights on data. From a private law viewpoint any definition of data is legally almost meaningless, as are definitions of the air, rain and sunshine. No one can sell and transfer rain and air without some form of appropriation. Only when clustered or contained (for example water in a bottle, oxygen in a cylinder) can water and oxygen become sufficiently defined, classified and specified for a subject to have a right about it towards a relevant and considerable group of other subjects (in other words: a "property" right).[2] Admittedly, unlike data rain and air are natural phenomena that exist without any human intervention, which inevitably limits the scope of the analogy that we draw, but that does not take away from the fact that both need a certain degree of specification in order to be (able to be) the object of property rights.

Even when looking at data from a purely contractual viewpoint, so not from a property law viewpoint, some form of demarcation will be needed for being able to conclude a contract about data. Although in contract law the description of a contract's object does not need to be as precise as with regard to any property entitlements, still a contract needs some clarity as to what it is about.[3] The same applies to data. The statement: '*I own this data*', whether it is said by a private person or by a tech giant, is, legally speaking, the same as the assertion by someone saying: '*I own the sunshine on my solar panels*' or a declaration by an electricity producer that: '*We own the wind around our wind farm*'. Statements about data as such are unavoidably so broad that they cannot function as a basis for legal policies, principles and rules. They are badly in need of being more targeted. For this we must be able to capture data in the form of a legal object. A major difficulty

1 This is often also called 'ownership', but it will be obvious that this type of ownership is fundamentally different from ownership of a tangible. See, among many others, Jeffrey Ritter, Anna Mayer, 'Regulating data as property: A new construct for moving forward' (2018) 16 *Duke Law and Technology Review* 220 and Sjef van Erp, 'Management as Ownership of Data' in Sebastian Lohsse, Reiner Schulze and Dirk Staudenmayer (eds.), *Data as Counter-Performance: Contract Law 2.0?* (Hart/Nomos 2020) 77.

2 Cf. Sjef van Erp, 'A Case Note from a Dutch Perspective' (2012) 20 European Review of Private Law 1165, discussing William Norris, 'Norwegian Supreme Court 27 May 2011, Norsk Retstidenda 2011' (2011) 20 *European Review of Private Law* 1159.

3 Herbert Zech, 'Data as a tradeable commodity' in Alberto De Franceschi, European Contract Law and the Digital Single Market. The Implications of the Digital Revolution (Intersentia 2016). See also Lutz-Christian Wolff, 'The relationship between contract law and property law' (2020) 49 *Common Law World Review* 31.

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here is that data is non-rivalrous, because it can be copied infinitely, which makes data hard to encapsulate. To some extent capturing data can take place by means of a carrier, because data cannot exist without a physical or human carrier, or by means of software such as Distributed Ledger (blockchain) Technology.[4] In that case a legal object (not an object of property rights, though) could be 'all data on this USB stick' or 'all data on the chip implanted under your skin'.

1.2 The difficulty of (capturing and) regulating the use of and access to co-generated data

These are, in spite of the problems already described, still relatively simple cases. However, data is gathered everywhere, processed in various ways, analysed at several levels, stored in different places and this is going on constantly against a backdrop of bigger than big data collections. Most data cannot be captured as easily as a block on a blockchain or data on your USB stick, because it is in constant motion. How to create a legal object, in the stricter sense of an object as to which a subject may claim a right against a considerable and relevant group of other subjects, out of this continuous flow of streams, activities, services?[5] Legal objects tend to be static, such as a house or a car, but a flow by its very nature is dynamic. Do we not need a re-thinking of what can be a legal object given that the number of such flows is ever growing? What does the dynamic nature of such objects mean for the entitlement to any economic benefits?

These are the questions we face when looking at data more generally. However, even more questions arise, in particular in terms of regulating the use of and access to the data, when data emanate from different sources in the sense that more than one party can be said to have (somehow) contributed to its generation, in other words: *co-generated data*.[6] In these cases we are not only faced with the difficulty of capturing data as legal objects, but also, if we would find that it is possible to capture data in a legally sufficient and meaningful way, with the challenge of deciding to whom (and which) rights in the data should be afforded. Do we afford all rights to one single party, for instance the party that has contributed the most to the generation of the data, or do we afford rights to different parties at the same time? And if we opt for the latter approach, in which more than one party has a right in the same set of data, do all parties involved have the same rights or are the nature and scope of their rights different, for instance dependent on what they need or how they have contributed to the creation of the data? Obviously defining, classifying and specifying co-generated data is a first step, but more steps are needed. It is these next steps, which consist of regulating the use of and access to co-generated data, that are at the core of this contribution.

This contribution does not pretend to give final answers or solutions. Its main aim is to shed some light on how longstanding principles of (among others) Dutch, German and Belgian property law could prove useful in finding a way to regulate the use of and access to co-generated data. These property law principles are in place, and have been in place for a very long time, to solve the ownership issue that arises when, as is the case with co-generated data, more than one party can be said to have somehow contributed to the creation of something, that something in the case of traditional property law being a tangible. It is obvious that these traditional rules cannot be applied directly as they apply to 'tangible goods' only whereas data is neither tangible nor a good. Moreover, data is non-rivalrous and non-depleting, can be used for many parallel purposes and is of a highly dynamic character. However, even when considering the very different nature of data, compared with the objects that are the prime focus of the rules on accession, commingling and specification, these rules should not be rejected straight away. They might express acquired wisdom about how to deal with situations in which questions arise about ownership and control of objects to the creation of which different parties have contributed, either by providing components and materials or by performing work.

We will argue that, although co-generated data once accepted as a legal object is of a very different nature than traditionally recognised tangibles (and even intangibles) as legal objects, some guidelines and directions concerning the distribution of the economic benefits regarding co-generated data can be found by drawing an analogy with traditional property law principles. We will do so by discussing the recently adopted *ALI-ELI Principles for a Data Economy – Data Transactions and Data Rights*[7] (hereafter: the ALI-ELI Principles), which contain specific rules on the use of and access to co-generated data in which certain choices and approaches can be traced that are similar to the aforementioned principles. For that reason, and because they are the result of close cooperation between European and American

4 This is why cryptocurrencies are now a prime target for law makers, as they can be captured as legal objects. See, for example, the Digital Finance Package presented by the European Commission on 24 September 2020, to be found at: https://ec.europa.eu/info/publications/200924-digital-finance-proposals_en, (accessed 17 March 2021). See particularly Commission, 'Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937' COM(2020) 593 final, and the definition of "crypto-asset" in article 3(2): "crypto-asset' means a digital representation of value or rights which may be transferred and stored electronically, using distributed ledger technology or similar technology".

5 For an, albeit brief, analysis of this see the blogpost by Charlotte Ducuing, ''Data rights in co-generated data': How to legally qualify such a legal 'UFO'?' (CiTiP, 12 november 2020) https://www.law.kuleuven.be/citip/blog/data-rights-in-co-generated-data-part-2 (accessed 17 March 2021), referring to Hugh Breakey, 'Two concepts of property: Ownership of things and property in activities' (2011) 42 *Philosophical Forum* 239. Ducuing also refers to the phenomenon that this development has characteristics of a return to feudal concepts. That has been raised before, but should not surprise as the Common Law in its approach to ownership and property law questions never abandoned its feudal roots, as the Civil Law did after the French Revolution. Cf., among others, Natalie M Banta, 'Property Interests in Digital Assets: The Rise of Digital Feudalism' (2017) 38 *Cardozo L Rev* 1099. Such development would, from a Civil Law perspective, come down to an unbundling of the unitary right of ownership. The Civil Law ideal of ownership is one subject having a right unlimited in extent and time against all other subjects regarding an object, making it possible to argue that the right is "in the object" or "in rem". That, of course, is remarkable as objects cannot have neither rights nor duties, unless they are made subjects as we now occasionally see happening in environmental law where for example a mountain range is given legal personality as happened in New Zealand. See Andrew Geddis and Jacinta Ruru, 'Places as Persons: Creating a New Framework for Maori-Crown Relations' in Jason Varuhas and Shona Wilson Stark (eds), *The Frontiers of Public Law* (Hart Publishing 2019). The Common Law, being less idealistic and more pragmatic than the Civil Law, focusses more on who of several subjects could claim a right, the content and time period of which will be purpose oriented, against a relevant and considerable group of other subjects regarding an object. This is what the "bundle of rights" approach is all about, as so profoundly analysed by Wesley Hohfeld. See Ted M. Sichelman, 'Wesley Hohfeld's Some Fundamental Legal Conceptions as Applied in Judicial Reasoning (Annotated and Edited)' in: Shyam Balganesh, Ted Sichelman and Henry Smith (eds.), *Wesley Hohfeld a Century Later: Edited Work, Select Personal Papers, and Original Commentaries* (Cambridge University Press 2021, forthcoming).

6 '[...] *data is usually generated by the contribution of various parties, e.g. by being the subject of the information, or the owner or long-term user of the object of the information, by performing an activity by which the data were generated, or by having rights in a product or service that has contributed to the generation of data.*' Response to the public consultation on "A European strategy for data", p.6.

7 The full text of the ALI-ELI Principles is published on https://www.principlesforadataeconomy.org.

legal scholars, the different sections of this contribution will be largely structured around the ALI-ELI Principles. However, the aim of this contribution is not to discuss all ALI-ELI Principles extensively and in detail, but to single out these specific principles that focus on co-generated data and the regulation of its access and use, including the distribution of the economic profits derived from the use of the data, and link or compare them to traditional principles of property law. We decided to focus on Dutch law, German law and Belgian law, because in these legal systems accession, commingling and specification are well-established and elaborated principles and because in terms of both language and availability these legal systems' statutes, case law and literature are accessible to the authors of this contribution. However, the main reason to focus on Belgian law is the recent introduction of a whole new book on property law into the Belgian Civil Code. That piece of legislation has entered into force on 1 September 2021 and has made quite some changes to the rules on accession, commingling and specification.

2. Co-generated data and data rights under the ALI-ELI Principles

2.1 Defining data and co-generated data

2.1.1 Data

Because data is, above all, a technical phenomenon, a first question is whether the definition of data (and co-generated data) should be purely technical, purely legal or mixed technical and legal. Let us begin with a technical definition. The International Standardization Organization (ISO) defines data as follows: '*reinterpretable representation of information in a formalized manner suitable for communication, interpretation, or processing*', to which is added in a note that data '*can be processed by humans or by automatic means*'.[8] Taking one step aside we need to ask ourselves what is meant by 'information'. It cannot come as a surprise that what constitutes 'information', as it is at the same time so very elementary but also deeply elusive, in academic literature is presented more as a notion than a definition.[9] The ISO, nevertheless, provides the following definitions: '*data that are processed, organized and correlated to produce meaning*', to which is added in a note: '*Information concerns facts, concepts, objects, events, ideas, processes, etc.*' and: '*knowledge concerning objects, such as facts, events, things, processes, or ideas, including concepts, that within a certain context has a particular meaning*'.[10] However, each of the terms mentioned here (just to name 'facts') raises even further terminological questions. The ISO gives the following definition of information processing: '*systematic performance of operations upon information, that includes data processing and may include operations such as data communication and office automation*'. [11] Information processing is, therefore, not equal to data processing, which, according to the ISO is: '*systematic performance of operations upon data', such as '[a]rithmetic or logic operations upon data, merging or sorting of data, assembling or compiling of programs, or operations on text, such as editing, sorting, merging, storing, retrieving, displaying, or printing*'.[12]

Although these definitions may be clear from a technical viewpoint, from a legal viewpoint they are not. When looking at data from the perspective of the law our angle is the application of a normative, prescriptive framework, fundamentally different from a context aimed at describing bare technical facts. Legal definitions have an important role within this normative framework and by themselves already imply a prescriptive element, because they are meant to be used in the application of norms. However, a legal definition of data cannot ignore how data exist in a technical sense.

It can, therefore, be no surprise that the first legal definitions of data that we see appearing are of a mixed technical-normative nature, such as the definition of data in the ALI-ELI Principles. There data is defined as '*information recorded in any machine-readable format suitable for automated processing, stored in any medium or as it is being transmitted*' (Principle 3(1)(a)). Clearly this definition is a combination of both technical elements and normative elements. The latter can in particular be found in the requirement that the data must be recorded in a machine-readable format and stored in any medium (or be in state of transmission), which in our opinion is an important first step towards making data fit for being a (potential) object of legal rights. That is done by excluding all 'data' that is not recorded in the said format and/or that is not stored in a medium, a substantial part of which is too 'remote' and insufficiently specified (and specifiable) to be captured for legal purposes, such as creating and allocating rights to access and use specific data. In order for the latter to be possible, data needs to become far more concrete than for instance air, sunshine and rain. Oxygen in a container is a legal object, but oxygen in the air is a *res nullius*, which may be captured by all living creatures and belongs to all of us and to no one in particular; from a intellectual property law viewpoint we could perhaps say that it belongs to the public domain. We not only need to define (and perhaps classify), but we must particularly specify data, including co-generated data, before it can become a legally relevant object. In other words, specification functions as the container that captures data and, by doing so, makes it legally manageable. Although we absolutely recognize and would like to emphasize the need to specify data and co-generated data when regulating its use and access, we will leave this specific issue aside in the discussion below as the aim of this contribution is a different one. In this contribution we basically skip the very important step of specifying data and co-generated to make it a legally relevant object and instead focus on how and to whom the ALI-ELI Principles and the rules on accession, commingling and specification allocate rights in cases in which several people have somehow contributed to the creation of an end product.

Before starting the discussion, it must be noted that in the comments the drafters of the ALI-ELI Principles explain that the definition of data they have adopted includes both the layer that constitutes meaning ('semantic layer') and the specific form in which that layer is recorded or the code as such ('code layer'), but does not include the physical manifestation of that recording on a medium (e.g. a cloud server or a USB storage device),[13] which in the ALI-ELI Principles is called a copy (Principle 3(1)(b)). This means that if under the ALI-ELI Principles someone has a data right, which concept we will discuss below, the

8 ISO/IEC 2382:2015(en) Information technology — Vocabulary 2121272.
9 Cf., as an example, Luciano Floridi, Information: A Very Short Introduction (Oxford University Press 2010), particularly Chapter 2 where the language of information is discussed.
10 ISO 5127:2017(en) Information and documentation — Foundation and vocabulary 3.1.1.16, ISO/IEC 2382:2015(en) Information technology — Vocabulary 2121271.
11 ISO/IEC 2382:2015(en) Information technology — Vocabulary 2121275.
12 ISO/IEC 2382:2015(en) Information technology — Vocabulary 2121276.
13 Neil Cohen & Christiane Wendehorst, 'The ALI-ELI Principles for a Data Economy – Data Transactions and Data Rights. ELI Final Council Draft' (2021) 1, 30-31 https://www.principlesforadataeconomy.org. We would also like to draw the reader's attention to Christiane Wendehorst, 'Rights in Co-Generated Data – A new Data Ownership Debate?' in Bram Akkermans & Anne Berlee (eds.), Sjef-Sache. *Essays in Honour of Prof. mr. dr. J.H.M. (Sjef) van Erp on the Occasion of his Retirement* (Eleven International Publishing 2021) 535, which chapter was published after the submission of this contribution.

right is not limited to the digital data stored in the form of a file on for instance a specific hard disk drive, but it will extend to these digital data's semantic layer and code layer regardless of where and in how many places it is recorded on a medium. That approach seems to be at odds with the position that some authors have taken in stating that if we want to capture data for property law (or similar) purposes the focus should be on, and rights should be limited to, data's physical manifestation on a medium, such as a data file, as only in that case do data meet the specificity threshold.[14]

2.1.2 Co-generated data

All data is somehow 'generated' in the sense of created. It can be generated by humans ('human-generated data') or by machines ('machine-generated data'). Examples of human-generated data are Word documents and e-mails, examples of machine-generated data are logfiles and clickstream logs. However, it should be realised that often data is not generated by only one person or one machine, and thus being traceable to this one person or one machine but generated from different sources. This can happen both actively and passively. It happens passively for example in the Internet of Things by software embedded in the object, triggered by information gathered by sensors reacting to human behaviour (for example in case of a so-called "smart" doorbell, giving from a distance audio and video access to whoever is at your front door). It happens actively when, for example, data sets are being combined or one data set is used to analyse another dataset, resulting in a new dataset.

The ALI-ELI Principles define co-generated data as '*data to the generation of which a person other than the controller has contributed, such as by being the subject of the information or the owner or operator of that subject, by pursuing a data-generating activity or owning or operating a data-generating device, or by producing or developing a data-generating product or service*' (Principle 3(1)(h)).

2.2 Data rights

The ALI-ELI Principles introduce this novel concept called 'data rights', which in the words of the drafters are '*legally protected interests that arise from the very nature of data as information recorded in any form or medium*'.[15] The ALI-ELI Principles distinguish a non-exclusive list of four basic data rights: (a) the right to be provided access to data by means that may, in appropriate circumstances, include porting the data, (b) the right require the controller to desist from data activities, (c) the right to require the controller to correct data and (d) the right to receive an economic share in profits derived from the use of data (Principle 16(1) and (2)).

That it is not just about 'rights' representing 'interests' at the crossroads of contract and property becomes clear when data rights are further explained:[16]

> "The data rights dealt with under the ALI-ELI Principles fulfil functions similar to those fulfilled by ownership with regard to traditional rivalrous assets. However, the notion of data rights recommended by the ALI-ELI Principles is not identical to that of ownership rights. While the right to control a resource as against any person who has a lesser right is central to ownership in the classical sense, these Principles take the position that the right to have non-exclusive access to data or to port data is central to any equivalent of the concept of ownership in the data economy, not least because the overall welfare is normally increased where more than one person can exploit the data for economic purposes."

Although 'data rights' are of a sui generis nature and, following the ALI-ELI Principles, are not ownership, in our opinion they still resemble ownership, even when they are not exclusionary. It should be reminded that traditionally ownership could and can be limited by contractual arrangements and even by contracts with third party effect (think of so-called 'perpetual/chain clauses'), making it less exclusionary, and that in several legal systems a distinction is made between private and public ownership where public ownership is limited by restrictions in the general interest. Even when looked at from a more traditional private law viewpoint ownership of co-generated data would in many cases not be exclusionary in any case, because we would frequently encounter co-ownership, where ownership of one co-owner could not be fully exclusive having to respect the rights of other co-owners.

It could be questioned if the ALI-ELI Principles, at the end of the day and in spite of the new terminology, still do not follow a property law paradigm. The reason why the answer might be affirmative is that property rights precede and create allocation of wealth, and it is (among others) the allocation of wealth or distribution of economic benefits that may flow from a data right, in particular from the right to receive an economic share in profits derived from the use of data (which is data right (d) of Principle 16 of the ALI-ELI Principles).

2.3 To whom should data rights (in co-generated data) be afforded?

Are clear rules at all possible regarding the use of and access to co-generated data? On one side of the governance spectrum we could look at what 'fairness' requires. However, should we leave answering such a complicated question, which ultimately is about to whom the benefits of possibly very valuable data belong, to courts on the basis of a wide open-ended principle? At the other end of the governance spectrum are hard and fast rules. As far as tangibles are concerned, property law seems to be on that end of the spectrum as it provides courts with clear rules on how and to whom to afford ownership of 'co-generated' tangibles, which will be elaborated on in the next section. Given that the whole legal framework needed to guide and facilitate the digital economy in a balanced way is still very much in a state of flux, rules that do not leave any discretionary freedom will probably not function well. An open-ended norm given substance by policy-weighing factors might very well be offering the most optimal approach.

That also seems to be the road that the ALI and ELI propose to travel. Principle 19 starts of by stating that '*[d]ata rights in co-generated data arise from considerations of fairness.*' (Principle 19(1)). Fortunately, that rather abstract and open-ended start is given substance in the remainder of Principle 19 in that under this principle a party who had a role in the generation of co-generated data has a data right '*when it is appropriate under the facts and circumstances*'. The latter is determined by consideration of: (a) the share which that party had in the generation of the data, (b) the weight of that party's legitimate interest in being granted said right, (c) the weight of any legitimate interests the controller or a third party may have in denying the data right, (d) imbalance of bargaining power between the parties and (e) any public interest, including the interest to ensure fair and effective competition. Whether someone can be said to have had a role in the

14 See e.g. Koen Swinnen,'Eigendom van data? Reculer pour mieux sauter' 2019 *Tijdschrift voor Privaatrecht* 63, 80; Eric Tjong Tjin Tai 'Een goederenrechtelijke benadering van databestanden' 2018 *Nederlands Juristenblad* 1799, 1801.

15 Cohen & Wendehorst (n 13) 125.

16 Response to the public consultation on "A European strategy for data", ibid.

generation of co-generated data is to be assessed on the basis of the factors listed in Principle 18(1), the most interesting of which for the purposes of this contribution are '*the extent to which the data was produced by an activity of that party, or by use of a product or service owned or operated by that part*' (Principle 18(1)(b)) and '*the extent to which the data was collected or assembled by that party in a way that 10 creates something of a new quality*' (Principle 18(1)(c)) as these factors strongly resemble factors that are given a prominent position in the property law principles that we will discuss below. However, it must be noted that under the ALI-ELI Principles not the aforementioned factors carry the most weight, since the different factors are listed in order of priority with '*the extent to which that party is the subject of the information coded in the data, or is the owner or operator of an asset that is the subject of that information*' being first on the list.

3. Accession, commingling and specification in property law

3.1 Setting the scene

Property law is about rights in goods, which under Belgian, Dutch and (to some extent) German law can be both tangibles and intangibles.[17] Not just rights, but strong and comprehensive rights that have *erga omnes* effect, which means that they can be enforced against all, and hold the power to exclude others. These rights, which in this section we refer to as 'property rights', are connected to their object (i.e. the good) in such an intimate way that they cease to exist when their object ceases to exist and the powers they grant are strictly limited to the object. For instance, the owner of a plot of land has the power to use, cultivate and deny others access to his plot of land, but he cannot exercise such powers in relation to his neighbour's plot of land. Put differently, the boundaries of his plot of land are also the boundaries of his right of ownership and the powers it holds. The same is true for ownership of movables as well as for limited property rights, which are derived from the right of ownership in a (movable or immovable) good, such as usufruct, pledge and mortgage.

For the present discussion, the fact that property rights cease to exist along with their object is of particular importance. When talking about the end of the existence of an object, images of objects getting destroyed most likely come to mind, such as paintings going up in flames, sheets of paper dissolving in water or food being eaten.

However, property law scholars cannot help but also think of situations in which the object of a property right is attached to or is commingled with another object or is used by a craftsman to create a whole new object, because also these events might well mean the end of the object as an object of property rights. This association in the mind of property scholars follows from one of the most fundamental principles of property law, often called (translated literally) 'the unity principle',[18] according to which property rights, both ownership and limited property rights, can only exist in what the law considers a unity, which unity in property law is called 'a good', and not in what it considers the components of that unity. Generally speaking, in order for a physical object to be a good, it must show a certain degree of independence vis-à-vis other goods, in the sense that it may not be part of another good, and it must, as will be elaborated on below, consist of components that functionally and/or physically are one. As to the former requirement, let us take the example of a table and a machine. Both the table and the machine are goods, but the legs and tabletop that together make up the table and the nuts and bolts that hold together the machine are not, because they are part of a unity, to wit the table and the machine. To be clear, the legs, tabletop, nuts and bolts used to be goods but stopped being goods upon incorporation into the table or machine or, translated into the language of property law scholars, they stopped being the object of ownership (and limited property rights, if any) upon incorporation into the table or machine. This means that the owner of these objects loses ownership.

As long as the goods involved belong to the same owner, the impact of this loss of ownership is rather limited, at least if we look at it from the owner's individual perspective, because that owner is awarded ownership of the good of which his former goods are now components. However, things are different and come way closer to the issues that arise with regard to co-generated data when A uses B's table-leg to fix his table or when C uses D's bolts and E's nuts to build a machine. We have seen that in such cases the table-leg, bolts and nuts stop being goods leaving us with just the table and the machine. Who owns these goods? Does the table belong to A, to B or is it perhaps co-owned by A and B? And what about ownership of the machine in the creation of which, as is the case with co-generated data, multiple parties (C, D and E) were somehow involved? Similar questions arise in relation to co-generated data, which also owe their existence to the input from more than one party. In all three jurisdictions that we have researched specific rules are in place to address these ownership issues. The basic structure of these rules is the same in all three jurisdictions as they are centred around the same long-established concepts of accession, commingling and specification, the requirements and effects of which will be discussed and compared to the ALI-ELI Principles in the following paragraphs

3.2 The requirements of accession, commingling and specification

3.2.1 Accession

Accession can be said to be the archetype of the three concepts under discussion, which is evidenced by the fact that the provisions on accession are often referred back to in the provisions dealing with commingling and specification.[19] Roughly speaking, accession applies when two (or more) tangibles are by accident or deliberately combined or attached to each other in such a way as to form one single good ('a unity') that cannot be considered a whole new good vis-à-vis the goods involved. We will elaborate on the latter requirement in the discussion of specification below.

As far as a physical unity is concerned, the mere fact that two goods are physically attached or connected to each other does not suffice for there to be accession. In order for there to be accession based on a physical connection, the latter must meet a certain threshold. In Ger-

17 In this contribution the abbreviations BCC, DCC and GCC are used to refer to the Belgian Civil Code, the Dutch Civil Code and the German Civil Code, respectively.

18 See about the unity principle, among others: Joke Baeck, 'Algemene regels inzake het voorwerp van zakelijke rechten' in Vincent Sagaert and others (eds.), *Het nieuwe goederenrecht* (Intersentia 2021); Steven Bartels & Toon Van Mierlo, *Asser 3-IV* (Wolters Kluwer 2013); Pernille van der Plank, *Natrekking door onroerende zaken* (Wolters Kluwer 2016); Helena Fikkers, *Natrekking, vermenging en zaaksvorming*, (Ars Aequi 1999); Vincent Sagaert en Pascale Lecocq, 'Memorie van Toelichting' in *Belgische Kamer van volksvertegenwoordigers, Wetsontwerp houdende invoeging van boek 3 "Goederen" in het Nieuw Burgerlijk Wetboek* 2018; https://www.dekamer.be; Koen Swinnen, *Accessoriteit in het vermogensrecht* (Intersentia 2014); Jacomien E. Wichers, *Natrekking, vermenging en zaaksvorming. Opmerkingen bij de algemene regeling voor roerende zaken in het Burgerlijk Wetboek* (Kluwer 2002).

19 That is the case in both German law and Dutch law. See articles 5:15 and 5:15, section 1 DCC and § 947, section 1 GCC.

man law a very high threshold is applied as there will only be accession if the goods involved cannot be separated without destroying or (permanently) deforming either of them,[20] such as a poster that can only be removed from a billboard by scratching it off. A slightly lower threshold, which in itself is still a considerable threshold, is applied in Dutch law, which requires the physical connection to be such that it cannot be broken without causing substantial damage to either of the goods involved.[21]

Under Dutch and Belgian law there can also be accession on the grounds of there being a functional unity between two (or more) goods.[22] In that case not the way in which two goods are physically connected to each other matters, but the way in which these goods interact and operate as one does. More than that, the goods involved need not even be loosely connected to each other in order for accession to apply, a classic example of which is that of a key and a lock.[23] However, the majority of goods that are subject to accession on these grounds are goods that, besides operating as one, do show a physical connection but do not meet the physical threshold for accession, such as tiles and the roof they are placed on, a fridge and the kitchen it is installed in, a wheel and the bike it is mounted on and removable table-legs and the table they are part of. These goods belong together and should be kept together, which is why the law makes them the object of one single right of ownership, because the one good would be incomplete without the other (e.g. a bike without wheels) or was specifically designed with the other good in mind (e.g. a made to measure closet to be placed in a specific niche).[24]

3.2.2 Commingling

We are well aware that 'commingling' is not a word commonly used in property law to refer to the concept that we are about to discuss. In fact, it is not a property law term at all. The words English-speaking property law scholars would most likely use to refer to this concept are 'commixtion' and 'confusion', the two not being synonyms as the former is usually considered to apply to solid things and the latter to fluids. That distinction, however, is not made in Belgian, Dutch, and German law, which is why the neutral term 'commingling' is used in this article.

In general, one could say that the main difference between accession and commingling is that the former applies to goods that are attached to each other and the latter to goods that are mixed with each other (in such a way that they form a whole), the most obvious example of which are liquids, such as two portions of water or fuel that are mixed with each other. However, commingling is anything but limited to liquids as it also applies to the dissolution of a substance in a liquid (e.g. salt or a colouring agent in water), the mixture of gasses and the mixture of tangibles.

As far as the mixture of tangibles is concerned, national differences can be observed. For instance, under Dutch law commingling is strictly limited to the mixture of tangible goods that are commonly sold by volume, weight or number,[25] the most common example being that a of bulkhead in a ship's cargo hold giving way leading to two separate piles of sand or coal (of the same type) being merged into one. Under Belgian law, on the other hand, commingling applies to all cases in which tangibles are mixed in such a way that it is no longer possible to tell which one is which, regardless of whether these tangibles are commonly sold individually or by volume, weight or number. As a result, commingling will also apply in cases in which two pens of the same brand, series, model and colour are put in one pencil case without features such as serial numbers, inscriptions and signs of wear and tear enabling their owners to tell which one is which. These different approaches can easily be explained by the different rationales underlying commingling in Belgian law on the one hand and Dutch law on the other hand. In Dutch law, commingling was conceived and serves as a tool to solve the ownership (and limited property rights) issue that arises when two goods are mixed in such a way that they have become one. Who is the owner of the single good that is left? In Belgian law, on the other hand, commingling was conceived and serves as a tool to solve the ownership (and limited property rights) issue that arises when two (or more) goods are mixed in such a way that it is no longer possible to tell which one is which.[26]

3.2.3 Specification

Of the three concepts under discussion, specification, is arguably the most difficult one. The reason for this is that whereas accession and commingling apply to situations that (predominantly) only involve goods, specification applies to situations that involve both goods and a human act. True, accession and commingling will oftentimes, if not mostly, be the result of human action, but that action is of secondary importance, mainly instrumental and not of such a nature as to leave its mark on the unity that is formed.[27] Let us take the example of two iron bars that are welded together to form one single bar. Although there would not have been a single bar without the welding, the latter has not resulted in there being a good of a whole new or different kind as we had iron bars before the welding and are still faced with an iron bar after the welding. If, however, someone welds together a couple of iron bars to form the frame of a bike, a good of a very different kind is created. That is specification: thanks to the actions of its creator the end product is different from and can be considered a new good vis-à-vis the goods that were used for its creation.

20 § 93 GCC.
21 Art. 3:4, section 2 DCC.
22 This is clear from art 3:4, section 1 DCC and can be inferred from art. 3.8, §2, second section BCC as well as from the drafters' explanatory comments about this provision: Sagaert en Lecocq (n 18). With regard to Belgian law, see also Baeck (n 18).
23 See e.g. 'Art. 3.1.1.3 – MvA II', in: Christiaan Johannes van Zeben, Jan Willem du Pon & Margreet Olthof, *Parlementaire Geschiedenis van het nieuwe Burgerlijk Wetboek. Boek 3, Vermogensrecht in het algemeen* (Kluwer 1981); Baeck (n 18); Wim Reehuis, Toon Heisterkamp, Gerrit van Maanen & Grietje de Jong, *Pitlo Goederenrecht* (Wolters Kluwer 2019); Henk Snijders & Trix Rank-Berenschot, *Goederenrecht* (Wolters Kluwer 2017); Hanneke Spath, 'Afscheiding van bestanddelen en splitsing', (2004) *Ars Aequi*, AA20040091.
24 With regard to Dutch law, this was decided in the famous Dépex case: Hoge Raad 15 November 1991, ECLI:NL:HR:1991:ZC0412, NJ 1993, 316 (Dépex/Bergel).
25 Steven Bartels & Aart van Velten. *Asser 5. Eigendom en beperkte rechten* (Wolters Kluwer 2017) nr 71.
26 Obviously, the same issue also arises under Dutch law. In fact, in Dutch literature there is even a specific name to refer to these issues: 'improper commingling'. See for instance Wouter Nieuwesteeg, 'De implicaties van het Zalco-arrest' (2017) NTBR 41, 47; Reehuis et al (n 23); Albert Smelt, 'Oneigenlijke vermenging en het individualiseringsvereiste' (2003) *Ars Aequi* 348, AA20030348; Toon Van Mierlo & Kasper Krzeminski, *Asser 3-IV* (Wolters Kluwer 2020) nr. 561; Wichers (n 18) 150. Cases of improper commingling are decided applying the general rules on holdership and possession, the result of which is that the person holding the commingled goods is 'deemed to be their owner'.
27 See in particular Bartels & van Velten (n 25) nr. 73. See also Reehuis et al (n 23) 453; Snijders & Rank-Berenschot (n 23) 245; Foskea van der Ven, 'De huwelijksnacht van Tobias en Sarah. Ofwel enige opmerkingen over natrekking, zaaksvorming en vermenging' (2006) *RMThemis* 85, 88; Wichers (n 18) 204-205.

3.3 The outcome of accession, commingling and specification

3.3.1 Accession and commingling

a. Exclusive ownership for the owner of the principal component

Accession, commingling and specification all lead to the same question: who is the owner of the end product? In the case of accession and commingling ownership of the end product will be held exclusively by the owner of the end product's principal component.[28] From a purely legal-doctrinal point of view there is no acquisition of ownership in the sense of the said owner receiving a new right of ownership, because the new good is not considered to be a new good, but is considered to be the continuation of its principal component.[29] For instance, if a replacement table-leg is attached to an existing table, the table-leg ceases to exist from a property law point of view whereas the existing table continues to exist, the only change being that it henceforth includes the new table-leg. The same is true for the rights of ownership in the table-leg and the table: the former ceases to exist whereas the latter continues to exist and henceforth also includes the table-leg.

If none of the new good's components can be considered the principal component, the ownership issue is resolved in a different way. Instead of letting the right of ownership in one of the components survive, the rights of ownership in all components cease to exist and make way for a single right of ownership in the new good. That right of ownership is jointly held by the owners of the goods involved in proportion to the value of their goods,[30] 'jointly held' meaning that each of them holds a share in the right of ownership in the (entire) new good. As far as commingling is concerned Belgian law takes up a somewhat unique position in that under Belgian law commingling leaves untouched the position of the owners involved rendering redundant any inquiry into which good is the principal component.[31] This unique position can be explained by the fact that in the (new) Belgian Civil Code the concept of commingling was extended beyond its traditional borders to include all cases in which tangibles are mixed such that it is no longer possible to tell which one is which. It is provided in article 3.12 BCC that the owners shall execute their right in the end product 'in proportion to their rights'.

It has emerged from our legal comparative research that two aspects play a role in determining whether there is a principal component: (a) the functional or technical dependency of the end product on one of its components and, to a lesser extent, (b) the higher value of one of the components (vis-à-vis the value of the other components).

A. Both German law and Dutch law use the '*Verkehrsanschauung*' or '*verkeersopvatting*', which we will refer to as 'common opinion',[32] to determine whether there is a principal component. Under German law the common opinion is the only criterion to be used,[33] whereas article 5:14, section 3 DCC mentions both the common opinion and one of the components' higher value as relevant criteria. If we really strip it down to its core, the common opinion refers to what most people think of something. When applied to determine a good's principal component, it refers to what most people think of the hierarchy between the good's components, often narrowed down to what most people who are familiar or usually deal with the goods involved think.[34] Do they perceive one of the components as dominant or leading or does in their view none of the components really stand out? To reduce the uncertainty that inevitably comes with using a criterion of this kind and to give legal practitioners something to go on, the national courts have crystalized when according to common opinion a component is a good's principal component. The German Supreme Court has held that a component can be considered the principal component if all other components can be taken away without changing the end product's essence ('*das Wesen der Sache*').[35]

Although Belgium law does not know the concept of 'common opinion', the criterion set forth in the first section of article 3.57 BCC does not seem to be very different from the one used in Dutch and German law. Whereas in the latter legal systems the legislature has left it to the courts to crystalize the common opinion, which in crystallizing the common opinion attach great importance to the use and functionality of the good, the Belgian legislature has skipped that step and has, in the aforementioned provision, established the criterion of 'functional necessity', which holds that in order for a component to be a good's principal component it must be necessary for the functioning of that good.

B. In German law there is some debate over whether in cases in which the common opinion is of no avail (e.g. commingling of goods of the same kind) a court can base the decision to call one of the components the principal component on that component's (substantially) larger size or value.[36] It is not debated, however, that in all other cases the common opinion is the only factor to be taken into account in deciding whether there is a principal component. That is different in Dutch and Belgian law, although also in these legal systems the common opinion is clearly the dominant factor.

As far as Dutch law is concerned, we have already noted that in the Dutch Civil Code the value of the components is mentioned alongside the common opinion as a criterion for determining the principal component. Under this criterion, the component with a value that substantially exceeds the value of the other components is the principal component. Despite the seemingly equal weight given to both criteria in the Dutch Civil Code, the common opinion is commonly considered to prevail in that the component with the highest value will not be a good's principal component if according to common opinion another component is the good's principal component.[37] If the common opinion is indeed the decisive crite-

28 See art. 3.57, first sentence BCC, art. 5:14, section 1 DCC and § 947, section 2 GCC.
29 See in particular Wichers (n 18) 139-140. See also Bartels & van Velten (n 25) nr. 69; Reehuis et al (n 23) 449.
30 See art. 5:14, section 2 DCC and § 947, section 1 GCC.
31 Art. 3.12 BCC.
32 Also use this translation, e.g. Dennis Faber & Ben Schuijling, 'Leasing under Dutch law' (2011) 16 *Uniform Law Review* 373, 393; Kim Hoofs, *Doorbreking van de natrekking in rechtsvergelijkend perspectief* (Wolf Legal Publishers 2013) 258; Ina Knobel, 'Accession of Movables to Land, South African and Dutch Law', (2012) 45 *Comparative and International Law Journal of Southern Africa* 77, 85.
33 See e.g. Reichsgericht 4 August 1936, BeckRS 1936, 100248, nr. 10; BGH 3 March 1956, NJW 1956 788, 789; Oberlandesgericht Düsseldorf 24 January 2003, NZI 2003 379, 380; Jens Thomas Füller, 'BGB § 947 Verbindung mit beweglichen Sachen', in: Reinhard Gaier (red.), *Münchener Kommentar zum BGB VIII* (Beck 2020) para 2.
34 Refer to this narrowing down to a specific part of society, e.g. Baeck (n 18) 29, 39; Fikkers (n 18) 39; Snijders & Rank-Berenschot (n 23) nr. 3.6.1.
35 BGH 3 March 1956, NJW 1956 788, 789.
36 See about this debate: Fritz Baur, Jürgen F. Baur & R. Stürner, *Sachenrecht* (Beck 2009) 697. Füller (n 33) para 2 writes that in determining whethere there is a principal component the only factor to be taken into account is the common opinion.
37 See e.g. Rechtbank Groningen 11 June 2004, ECLI:NL:RBGRO:2004:AQ7497, NJF 2004, 460; Bartels & van Velten (n 25) nr.

rion, that does not mean that the value criterion is redundant and of no value. Firstly, the value criterion could be seen as a stable specification of the common opinion and as such serves as an aid in applying an abstract criterion such as the common opinion to specific cases. Secondly, and most importantly, the value criterion offers a way out in cases in which the common opinion is undecided, which is also the role of the value criterion in Belgian law, with the difference that in this legal system the difference in value need not be substantial.[38] Under German law, on the contrary, co-ownership will always be the outcome in cases that cannot be decided on the basis of the common opinion (because the latter is undecided) as there the common opinion is the only element to be taken into account.

Cases in which the common opinion is undecided are likely to emerge when goods of the same kind are connected or commingled, as is evidenced by the facts of the famous Zalco-case, where different portions of (the same) steel were commingled in the oven of a steel company in liquidation. In its decision in the Zalco-case, the Dutch Supreme Court has pointed out that in cases such as the one presented to it, only the value of the components will be decisive. Interestingly, the court has also given a clear instruction on how to apply the value criterion in stating that in view of the far-reaching consequences of accepting that there is a principal component, i.e. loss of ownership and limited property rights in the other components, the existence of a substantial difference between the value of the components should not be easily accepted. In other words, the Dutch Supreme Court shows a clear preference for co-ownership (over single ownership) in cases that are too close to call.

It is noteworthy that the Dutch Supreme Court refers to the loss of ownership by one of the owners as the reason why courts should be reluctant to conclude that there is a principal component, because that actually boils down to the Supreme Court holding that given society's undecidedness on this matter it would be 'unfair' to leave an owner empty-handed. In our opinion a similar approach should be followed when filling in what 'fairness' requires with regard to affording rights in co-generated data. Just like accession and commingling cases in which the common opinion is undecided, co-generated data cases will often be too close to call as none of the contributions to the creation of the data can be said to really outweigh the other contributions. In such cases all parties involved, provided that they have a reasonable interest in having some form of control of or access to the co-generated data, should be granted data rights instead of digging deeper trying to find some reason to find in favour of one party and against all other parties. As mentioned before, that is also the approach German property law follows with regard to accession and commingling when the common opinion is undecided, because in such cases it does not turn to other criteria, such as the value and the size of the components, to increase the chances of finding a principal component after all.

b. Comparison to the ALI-ELI Principles

In its core the approach followed by the drafters of the ALI-ELI Principles is fundamentally different from the rules on accession and commingling. Basically, the latter seek to find a single party to whom the one and only right in the end product (i.e. ownership) can be afforded. Only when it is has proven impossible to find such party, because none of the components can be considered the end product's principal component, more than one party will be given a right in the end product. In that case each party holds an interest in the end product, the size of which might be different but the nature of which is the same for all parties as each of them holds a share in the (single) right of ownership in the end product.

Unlike the rules on accession and commingling the ALI-ELI Principles do not seek to centralize all powers in one single party. Instead, they are aimed at providing a data right to all who (in a specific way) have contributed to the creation of co-generated data. The result of that approach is that with regard to the same set of co-generated data several data rights can be held by different parties at the same time. Moreover, these rights are not necessarily the same as the ALI-ELI Principles distinguish four different types of data rights.

In spite of these differences the ALI-ELI Principles and the rules on accession and commingling also have several things in common. Firstly, property law is not a stranger to the idea of providing rights to several parties as accession and commingling lead to co-ownership when there is no principal component. Secondly, both the ALI-ELI Principles and the rules on accession and commingling have regard at the extent to which a party has contributed to the creation of the end product in determining (a) whether a right in the end product should be afforded to a party and (b) what that right looks like or how it should be afforded (i.e. the modalities of the right).

A. Under Principles 18(1)(b) and 19(2) a party whose contributions are '*insignificant in the circumstances*' will not be afforded a data right, because he is not considered to have played a role in the generation of the co-generated data. Even if a party's contribution meets the aforementioned threshold, it is still uncertain whether that party will actually be granted a data right as everything depends on whether granting him a data rights is '*appropriate under the facts and circumstances*' (Principle 19(2)). That decision must be made based on five factors, one of which is the share which that party (considering the factors listed in Principle 18) had in the generation of the relevant data. Just like the party whose contributions to the creation of co-generated data were insignificant, a party whose good is not the principal component will not be afforded any right in the end product. In other words, that party's contribution, which obviously is an indirect one as it consists of willingly or unwillingly supplying a good that is used for the creation of the end product, can be said to be too little or insufficient to be granted a property interest in the end product.

B. The extent to which a party has contributed to the creation of co-generated data, which in this contribution we could also refer to as 'the end product', is not only relevant in deciding whether that party should be granted a data right, but also in deciding how and the circumstances under which that data right should be afforded. For instance, if by virtue of his data right a party has the right to access co-generated data, should the access be granted for free or for a remuneration? In response to this question the drafters of the ALI-ELI Principles explain that in making a decision '*the court or legislator will have to consider, amongst other factors, the type and weight of the parties' shares in the generation of the data*'[39], seemingly stating that the scope of and restrictions to a party's data right are (partially) determined by the extent to which that party

69; Snijders & Rank-Berenschot (n 23) nr. 283; Foskea van der Ven, 'De huwelijksnacht van Tobias en Sarah. Ofwel enige opmerkingen over natrekking, zaaksvorming en vermenging' (2006) *RMThemis* 85, 88; Wichers (n 18) 126-127.

38 As to Belgian law this is only true for accession as commingling always leaves the existing rights of ownership untouched (art. 3.12 BCC).

39 Cohen & Wendehorst (n 13) 144.

has contributed to the creation of the data.

Property law in fact proceeds along very similar lines when dealing with cases in which none of an end product's components can be considered its principal component. As we discussed earlier, in such cases all parties involved will be granted a share in the (ownership of the) end product, the size of which is determined by the value of that party's good (now component). Once again, the extent to which a party has (indirectly) contributed to the creation of the end product determines the size or scope of that party's legal interest in the end product.

3.3.2 Specification

a. Exclusive ownership for the creator of the end product

The basic rule to solve the ownership issue that arises in specification cases is the same in Belgian, Dutch and German law: the creator of the end product (or the person who had the end product created) is also its owner. The corollary of this basic rule is that the owners of the goods that were used in the creation of the end product lose ownership. Not only the basic rule is the same in all three legal systems, but also the exception to that basic rule. Under this exception the end product will not be owned by the creator if the costs of creation are substantially outweighed by the value of a component. In that case, the new good will be owned by the owner of that component.[40] That is slightly different under Dutch law, where the exception to the basic rule holds that the new good will not be owned by the creator if the costs of creation are just too low to grant that party ownership of the end product (art. 5:16, section 2 DCC). Instead, ownership of the new good will be afforded on the basis of the rules that apply in accession and commingling cases, which means that the owner of the principal component or, in the absence of a principal component, the owners of the components jointly will own the end product (art. 5:16, section 3 DCC).

In our opinion the basic rule of specification must be included in the set of rules that regulate access to use of co-generated data, at least as far as the part on affording rights to the good's 'creator' is concerned. The above discussion of the requirements of specification has shown that for the purposes of specification an end product's 'creator' is the person who by means of his actions has transformed the goods he has used into a good of a new kind and as such has left his mark on that good. If, for example, someone has collected, combined, structured or analysed existing data in such a way that somehow a new layer is added or a data collection of a new kind is created, that person should be granted data rights in the co-generated data.

b. Comparison to the ALI-ELI Principles

It is safe to say that the drafters of the ALI-ELI Principles are of the same opinion as one of the factors to be taken into account in determining whether data is to be treated as co-generated by a party is 'the extent to which the data was collected or assembled by that party in a way that creates something of a new quality' (Principle 18(1)(c)). It is obvious from the drafters' comments that this specific factor refers to the situation in which a party has processed existing data 'in a way that potentially adds value and makes it 'new' data.'[41] Like the creator of a new tangible, by performing certain actions with regard to existing 'objects' that party creates something that did not exist before and for that reason must be rewarded with a right in that new something. Unlike the creator of a new tangible, however, that party will most likely not be the only one to be granted a right. Principles 18 and 19 set forth several grounds on the basis of which a party can be granted a data right, which in practice will most likely result in more than just one party having a data right in co-generated data.

4. Conclusion

Data is co-generated when it originates from different sources. It could be created by several machines functioning in sequence or parallel, in sequence or parallel activities of several human beings or it could be both machine and human generated. The mixture might result from both passive and active events. It could very well be the case that in the not too far away future co-generation is how data is usually created. Or it might even already be happening today when looking at the exponential growth of the Internet of Things. This makes the debate as to who is 'entitled' or 'owns' data even more fraught with problems than we already now encounter. Accepting that ownership of data can never be equal to ownership of a tangible and comes down to data management, this does not mean that the acquired wisdom underlying old and well-established property law principles regarding accession, commingling and specification of goods might not prove to be a basis for the drawing of analogies or at least provide some food for thought.

After discussing the nature of data in light of how data could qualify as a legal object, we examined how (data)rights concerning co-generated data might be developed by looking at both the ALI-ECLI Principles and long-standing principles of property law. We started of by contending that applying both an open-ended norm as 'fairness' and the opposite form, hard and fast rules, might not be the best solution as applying the former runs the risk of being over- and underinclusive and might come down to, in fact, not presenting a governance structure at all, giving way to the same market forces that any governance structure should be controlling, and applying the latter would prove to be counterproductive. An open-ended norm given substance by policy-weighing factors might very well be offering the most optimal approach.

The ALI-ELI Principles seem to be going in that direction in that they combine the concept of 'fairness' with specific factors to be taken into account in determining whether someone is to be considered as having contributed to the creation of co-generated and should be granted a data right. In this contribution we have compared these factors as well as the overall approach taken by the ALI-ELI Principles to the property law principles of accession, commingling and specification and have found there to be both differences and similarities. Whereas the idea of affording ownership of the end product (i.e. a tangible) to one party involved is dominant as far as accession, commingling and specification are concerned, the ALI-ELI Principles are aimed at affording rights in the end product (i.e. co-generated data) to several parties involved. Despite these different approaches, both the ALI-ELI principles and the aforementioned property law principles attach considerable weight to the extent to which a party has contributed to the creation of the end product in determining whether and how a party should be granted an interest in the end product.

Building on the findings of our legal comparative analysis and the particular challenges presented by co-generated data we argue that certain long-standing principles of property law will likely prove useful in regulating the use of and access to data as might express acquired wisdom about how to deal with situations in which questions arise about ownership and control of objects to the creation of which different parties have contributed, either by providing components and materials or by performing work. For instance, a fair attribution of

40 See § 950, section 1 (first sentence) GCC and art. 3.56 BCC.
41 Cohen & Wendehorst (n 13) 136.

(data)rights and the attached sharing of benefits might take into consideration elements such as how that part of society that is familiar with data and its creation, collection and use thinks about affording certain data rights to a party that in a specific way has contributed to the generation of the co-generated data, which in the context of accession, commingling and specification is called 'the common opinion'. In cases where different parties have contributed to the creation of co-generated data in a very similar or equal way, in the sense that none of the contributions really outweighs the others, the preferred option would be to follow the example of the rules on accession and commingling and to grant data rights to all parties involved instead of only one party involved.