

**Accounting and the territorialization of markets:
A field study of the Colorado cannabis market**

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Abstract

This study examines the role of an inventory tracking and accounting system in the creation of a new market for legal cannabis in the US state of Colorado. Inspired by the empirical setting and the work of Deleuze and Guattari, we illuminate different processes associated with the management of flows (of people, aspirations and things) into, out of, and within the market. Our findings contribute to our understanding of how accounting is implicated in the territorialization of new governable entities. We show how accounting, as a market device, is involved not only in performing economic and other theories, but in populating market spaces with certain elements and not others. Finally, we suggest that our analysis has policy and regulatory implications related to phenomena of contemporary interest such as traceability of global supply chains and the social and economic consequences of tracking and tracing systems.

Keywords: Territorialization; Assemblage; Intensity; Flow; Cannabis; Market Devices

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Introduction

A variety of influential studies (e.g., for an overview see Miller & Power, 2013; Muniesa et al., 2007) have shown how accounting and other devices enable, format, and frame distinctive possibilities for economic interaction, thereby making abstract (e.g., cost centers, markets) and physical (e.g., a factory floor, a hospital ward) entities visible, calculable, and governable. Studies such as these provide evidence of what has been described in accounting research, often inspired by the work by Foucault (Mennicken & Miller, 2012; Raffnsøe et al., 2019), as the *territorializing* capacity of accounting and other devices. Through a recursive relationship between accounting practices and an array of economic and other ideas and bodies of knowledge, new entities ranging from individuals to fields are simultaneously constituted and made amenable to government (Miller & Power, 2013).

In this paper, we argue that our understanding of territorialization, often stressing the constitution of boundaries of governable entities, can be enriched by also attending to *flows* (of people, things, practices, and ideas) into, between, and within these entities. To this end, we draw on the work by Deleuze and others (DeLanda, 2016; Deleuze & Guattari, 1987; see also Martinez & Cooper, 2017, 2019; Neu et al., 2009) to analytically reflect on two territorializing processes of assemblage formation: one that involves setting boundaries that may restrict or enable flows; and another that involves assigning more or less stable and clear-cut functionalities to what flows within and across boundaries. Taking inspiration from DeLanda (2016), we also explore how human actors can attempt to shape assemblage dynamics by adjusting the boundary opening/restricting and functionality-ascribing territorializing processes, as if they have available two *knobs* that can be turned up and down, and mutually adjusted one to the other. As a result, our conceptual background enables us to explore a plurality of *territorialization intensities* (e.g., in our analysis one related to establishing boundaries; another related to ascribing functionalities) which can vary over time, across different settings, and in relation one to another.

We ground our analysis in a four-year long study of a legal market for recreational cannabis in Colorado. This is an apt setting to study accounting and territorializing processes, with a particular focus on flows, for two reasons. Firstly, the regulation of the movement of

people, things, practices, and ideas into and within a market is a central task for the state regulators that we study. Since cannabis remains illegal at the Federal level in the USA, regulators in Colorado need to demonstrate full traceability of the physical cannabis product (Power, 2019). To ensure public safety, they need to demonstrate total control of the product, the prevention of “diversion” of cannabis to minors or neighboring states, and the ability to test products and issue product level recalls. In addition, to succeed as a public policy, the legal market needs to rival and eventually replace the existing illegal and semi-legal markets. Regulators therefore must encourage and entice largely unknown “black market” practices, ideas, and people “out of the shadows” and into its zones of control (Palermo et al., 2016). This mandate is reflected in the legislative requirement that the regulations do not impose any demands that are “unreasonably impracticable” for market participants (State of Colorado, 2012, p. 4).

Secondly, what Hudak (2014) calls the “backbone” of Colorado’s regulatory architecture is the Marijuana Enforcement Tracking and Compliance system (METRC). METRC has much in common with other accounting systems, information systems, and market devices well-studied in the literature. Like the various “regulatory technologies” (Williams, 2013), “mediating instruments” (Miller & O’Leary, 2007), “ranking devices” (Pollock & D’Adderio, 2012), and “market devices” (Millo & MacKenzie, 2009) described in the accounting literature, METRC not only contributes to “seeing” the cannabis market (Scott, 1998), but also to making it amenable to state ambitions of inspection, taxation, and control. Like the well-studied corporate Enterprise Resource Planning (ERP) systems (e.g., Chapman, 2005; Dechow & Mouritsen, 2005; Newman & Westrup, 2005; Pollock & Williams, 2008; Quattrone & Hopper, 2001; Scapens & Jazayeri, 2003), METRC can also be seen as an assemblage of artifacts, software, indicators, visions of best practice, and prescriptions for improvement that altogether contribute to controlling products and transactions within organizations and across networks. On this basis, METRC can be seen as a form of accounting that connects our study to core themes in social studies of accounting, including debates about the constitutive role of accounting and the instability of accounting assemblages.

In our empirical analysis, we start by illustrating the role of cumulative regulatory interventions in defining the boundaries of the cannabis market assemblage. We document how a patient-caregiver model and a licensing system contributed to delineating the boundaries of the market and assigning functions to cannabis growers, distributors, and

users and to the seed-to-sale tracking of cannabis via METRC. This chronology reveals an increase in territorialization intensities, as a fairly predictable result of regulators turning up the two knobs that enable/restrict flows from crossing boundaries and ascribe functionalities to those flows that make it through the boundaries. We subsequently enrich the analysis by “zooming in” (Nicolini, 2009) on how METRC is implicated in the regulation of three specific kinds of flows: digital information inputted into METRC; cannabis seeds and plants; and the ideals, promises, and aspirations that underpin the functioning of METRC. In so doing, we illuminate various relational dynamics in which potentially threatening flows filter into the assemblage (e.g., as erroneous data, illegal plants, and industry aspirations) and are then territorialized into useful components that sustain both the safety and the commercial viability of the market.

By iterating between these empirical observations and our conceptual focus on flows and territorialization intensities, we develop three contributions. First, our analysis helps to better understand the relational properties of territorialization and their implications in the formation of assemblages. Compared to previous work (Martinez & Cooper, 2017, 2019; Miller, 2014; Miller & O’ Leary, 1994; Neu et al., 2009), we show that the intensity of territorialization is not a singular and evenly spread force. Instead, we provide insights into different territorializing processes, which vary in intensity across time and place, and which interact and affect each other in sequences that we describe. In so doing, we highlight that assemblage formation is contingent not only on how its components “act on each other” (Martinez & Cooper, 2019, p. 3), but also on the ways in which these components are (or not) brought into the assemblage and are given or acquire (or not) certain functionalities.

Second, our analysis contributes to our understanding of agency in territorializing processes. Recent work (Free et al., 2020) has challenged the accounting literature on territorialization (as portrayed, for example, by Miller & Power, 2013), arguing that territorialization results from some kind of “skillful” orchestration rather than “some mysterious force that emerges irrespective of the strategizing of individuals and groups” (Free et al., 2020, p. 487). Our conceptual apparatus is also sensitive to the role of skillful actors but places their actions in a web of relational, and often surprising, effects of assemblage formation dynamics. Through the metaphor of the knobs, we show how regulators purposefully seek to manage flows, modulating territorialization intensities to address concerns about the commercial viability of the market and public safety. However, we also show how the agency associated with these attempts remains distributed across

different market actors, varies across different settings and over time. The intention of regulators when they turn one knob is not pre-existing but emergent from the assemblage of which “knob-turning” is part and parcel. This includes adjustments needed in the other knob as well as responses to the territorialization aspirations of regulated entities.

Third, a variety of studies in accounting and beyond emphasize the performative role of accounting and other market devices (Muniesa et al., 2007) or mediating instruments (Miller & O’Leary, 2007), ranging from measurement systems and rankings to risk profiling tools and credit scoring technologies (MacKenzie, 2009; Millo & MacKenzie, 2009; Pollock & D’Adderio, 2012; Poon, 2009; Williams, 2013). Such devices are shown to impose order by making actual the ideas advanced in economic textbooks and elsewhere as well as constituting a stable reality allowing for dispersed agents to make long-term investments. We highlight, however, that such theories presuppose already assembled actors and spaces upon which order can be imposed. We enrich these studies by showing how, through dynamics related to the regulation of flows and varying levels of territorialization intensities, accounting and other devices are involved in populating market spaces in the first instance with certain elements but not others. These flows structure the range of possible futures that markets might achieve, and therefore must be considered alongside the performative struggles that only later take place on such grounds.

The rest of this article is structured as follows. In the next section we articulate our core notion of territorialization and its application to the research setting. This is followed by a description of our research methods and data analysis approach, as well as our empirical context. We then document how the cannabis market assemblage is territorialized by the state through various regulatory interventions and devices, including METRC. We then show how METRC is implicated in the regulation of three kinds of flows, and how this way of regulating flows affects territorialization intensities. The paper continues with a discussion of our contributions to the literature on territorialization, assemblage formation dynamics and market-making. The paper concludes with the study’s policy and regulatory implications and suggestions for further research.

Flows and territorialization intensities

Studies about accounting as a social and institutional practice have shed light on the territorializing role of accounting (see Miller & Power, 2013). This role refers to how,

through a recursive relationship between the practice of accounting and an array of economic and other bodies of knowledge, individuals, hospitals, factories, and fields are simultaneously constituted and made amendable to government (Arnold & Oakes, 1995; Carmona et al., 2002; Graham, 2010; Kurunmaki, 1999; Martinez & Cooper, 2017; Miller & O’Leary, 1994; Miller & O’Leary, 2007; Neu et al., 2006; Rahaman et al., 2010). Similarly, accounting can contribute to the territorialization of markets. For example, Miller and O’Leary (2007) show how technology roadmaps allocate distinctive possibilities to various actors in a nascent semiconductor industry, thereby allowing them all to contribute to the construction of a singular and more predictable future. MacKenzie (2009) highlights the way that measurement devices constitute similarities and differences between various gasses, thereby allowing a carbon market to emerge. Pollock and D’Adderio (2012) draw attention to a matrix-based ranking device that formats and frames various distinct competitive spaces in which information technology markets evolve.

This body of research on the territorializing role of accounting has affinities with research in economic sociology as well as science and technology studies on the role of market devices, namely the “material and discursive assemblages that intervene in the construction of markets” (Muniesa et al., 2007, p. 2). Like social studies of accounting, this literature emphasizes the recursive relation between bodies of knowledge, technologies, and the economy (Vollmer et al., 2009). It shows how theories and models of the market, enacted through devices such as stock tickers, mathematical formulas, and shopping carts, make actual or perform the kinds of markets that they presuppose (e.g., Cochoy, 2009; Millo & MacKenzie, 2009; Preda, 2006).

This brief overview of previous research provides a valuable, initial orientation for our analysis. It suggests that a legal cannabis market territory can be constituted from an assemblage of heterogenous and moving components such as regulatory bodies, industry actors, self-proclaimed cannabis experts, plants and seeds, devices to measure and monitor business conduct, and legal, geographical, political, and market discourses. It further highlights the capacity of accounting and other devices to establish boundaries and order, contributing to a governable entity: “an operating ensemble whose performance can be known and compared with others that are both proximate and distant” (Miller, 2014, p. 239). In our setting, Colorado’s central regulatory device—METRC—can be seen as playing a key role in such assemblage formation dynamics, framing and formatting the new

market territory so that what “good” market actors and what “best” practices are can be explicated in economic terms and acted upon (see Pflueger et al., 2019).

Bearing in mind this broad orientation to studying our setting as a market assemblage, we argue that the work of Deleuze and Guattari (DeLanda, 2016; Deleuze & Guattari, 1987; Martinez & Cooper, 2017, 2019; Neu et al., 2009) brings useful additional insights to our understanding of territorialization. While there are continuities between Deleuze and Guattari and ideas about assemblages and territorialization articulated in the accounting literature (see Mennicken & Miller, 2012, pp. 20-21), Neu et al. (2009) highlight that what differs is “the emphasis on the movement of such assemblages, what Deleuze and Guattari refer to as lines of flight” (p. 323). They continue by highlighting that “assemblages are never static but always in the process of becoming and un-becoming” (ibid). Central to the process of becoming and un-becoming are the dynamics of *flows*, as “every ‘object’ presupposes the continuity of a flow” (Deleuze & Guattari, 1977, p. 6). To understand capitalist formation, for instance, it is not enough to speak of the banks, state, labor, etc. but of flows, especially of money, that establish, maintain, and perturb their object-forming relations (see Smith, 2011).

In our analysis, we find it useful to draw on the work of Deleuze and Guattari and their contemporaries, for two main reasons. Firstly, this literature helps to reveal territorialization as composed of two distinct processes that can play a relevant role in the formation of a legal cannabis market assemblage. One refers to the creation of boundaries that define what is included and what is excluded, i.e., in our setting, what becomes part of the legal cannabis market and what does not. Our key focus here is on the ways in which movement is restricted (or enabled). This may include, as shown in the social studies of accounting, the creation of accounting entities, categories, standards, measurement systems (e.g., Arnold & Oakes, 1995; Hopwood, 1992; Kurunmaki, 1999; Llewellyn, 1998; MacKenzie, 2009) that filter out (or allow in) certain flows of people, devices, market practices and material elements such as cannabis plants. For instance, as Arnold and Oakes (1995) show in their analysis of US hospitals, accounting “constructs economic subjects, reinforces legal definitions of property rights, adjudicates transfers of wealth within and between entities; and creates information asymmetries across entity boundaries” (p. 106).

The other process refers to the way in which what enters and circulates within the boundaries of an assemblage is assigned (e.g., by regulators) or acquires (e.g., through its relations with other components) a specific function. The reason to add this second

dimension to an analysis of boundaries and entity-making is Deleuze's insistence on the way assemblage components continue to engage, to transform, and to be transformed by the other components that surround them once they flow into and become a part of an assemblage. Once part of an assemblage, its components are assigned new functions and may be able to do new things, as suggested in Deleuze's often-cited quote that "a club is a de-territorialized branch" (Deleuze & Guattari, 1987, p. 172). This quote suggests that a branch, linked to photosynthesis and providing vital resources to a tree, acquires another functionality when plugged into a different assemblage: it is a weapon in the warring assemblage. In addition, by including a new component, the assemblage itself changes. The new weapon changes the way horses are ridden and draws attention to the need to protect oneself from close-contact combat. More generally, not only does a branch acquire a new functionality, but it also changes how war is thought about and practiced.

Secondly, the work of Deleuze and Guattari allows us to see how the *intensity* of territorialization may be changing, multiple, and relational. In general, Deleuze and Guattari alert us to the significance of escapes from, and inclusion into, an emerging assemblage via de- and re-territorialization dynamics (see also Munro & Thanem, 2018; Neu et al., 2009). Building on the two territorializing processes described above, we can see more specifically how territorialization intensity may correspond to the degree to which a boundary filters things, ideas, and people from flowing through it. It may also correspond to the degree to which functions and behaviors are allowed to deviate from, or align to, existing norms of behaviors and practices within an assemblage. In addition, we can further explore how the two processes interact, one with the other, in ways that affect their intensities.

In order to apply this conceptualization of territorialization intensities to our empirical setting, we add to our theoretical repertoire DeLanda's intuition that an assemblage is "a concept with *knobs* that can be set to different values" (2016, p. 3; emphasis original).¹ With this metaphor, we can theorize territorialization intensities as the product of a *boundary knob* and a *functionality knob* being turned up and down, and adjusted or tuned in relation to each other and their individual and collective effects on flows. In so doing, we direct attention to agency and the role of skillful human actors which, as recently argued by Free

¹ DeLanda parametrises the notion of *assemblages* through knobs. We use the same principle to think about territorialization.

et al. (2020), is an area that remains relatively unexplored in accounting research on territorialization. Our general orientation to study the cannabis market as an assemblage reminds us that human and non-human actors never act independently (see also Latour, 2005, p. 46). Nonetheless, the knob-turning metaphor serves to foreground how there is purposeful work involved. State regulators, for example, can create and adjust the devices at their disposal, including METRC, as they attempt to manage various types of flows.

We can exemplify these territorialization intensities dynamics through the analogy of how a state may seek to territorialize its geo-political space. It can turn up a boundary knob to manage the flow of people and things at various levels of intensity through walls, armed guards, ID checks, etc. Alternatively, it may try turning up a functionality knob to manage the circulation of people and things inside of geo-political boundaries by assigning functions, markings, and establishing norms of expected behavior, etc. It can also turn both knobs in similar or opposite directions; for instance, turning down the boundary knob and allowing more people and things to flow in but turning up the functionality knob and more extensively regulating what they can and cannot do within, even beyond, state boundaries. This example illustrates how territorialization intensities may be unevenly spread across a territory, and how territorialization adjustments relate to different tactics (i.e., turning up and down different knobs) which authorities might seek to employ.

To summarize, in our analysis, we seek to mobilize the concept of territorialization to foreground how different flows are contained within the cannabis market assemblage; how they may escape and leak into or from it; and how the functionalities of such flows may change as part and parcel of the regulators' efforts to contain, control, and encourage the cannabis market to emerge. Our theoretical background sensitizes the analysis to the possibility that these elements may be present at varying levels of intensity as, metaphorically, two territorializing processes (one about boundaries and one about functionalities) operate through different knobs that can be adjusted over time and across places and time. Against this background, as we will show in the analysis that follows, governance and regulatory control is a matter of managing territorialization intensities to address the twin ambitions of containing and controlling the market as well as encouraging its emergence and competitiveness without any “unreasonably impracticable”² constraints.

² This “means that the measures necessary to comply with the regulations require such a high investment of risk, money, time, or any other resource or asset that the operation of a marijuana establishment is not

The field study

We conducted four fieldtrips to Colorado from 2015 to 2018 to learn about the cannabis market assemblage. We selected Colorado because it was the first state to legalize recreational cannabis in the USA and was a hub for many of the regulatory and entrepreneurial activities that would be featured in the media and in our research. Furthermore, it was said to be “ground zero” for cannabis legalization in the USA (Neil, 2014). It was also the first jurisdiction to experiment with a regulatory model based on an inventory tracking and accounting system such as METRC, thus making the setting particularly suited for the purpose of an analysis of accounting and territorialization.³

The first excursion was an opportunity for us to become familiarized with the primary actors and topics in the field. Our timing was based on the National Cannabis Industry Association’s national conference (the Cannabis Business Summit and Expo) held from June 29 through July 1 in Denver Colorado. We attended the various sessions and recorded presentations by technology entrepreneurs, manufacturers, growers, investors, regulators, and consultants, all key actors involved in shaping the cannabis market in Colorado and in the USA. To prepare, we combed through the program and contacted speakers individually for interviews. While in Colorado we also visited some dispensaries where cannabis is sold to the public. This first sample of interviews made explicit to us the importance of the regulatory model and the centrality it gives to tracking.

Five months later, in November 2015, we embarked on our second fieldtrip, which took us to the offices of state regulators, the Marijuana Enforcement Division (MED) in the state Department of Treasury, where we learned about their aspirations, licensing model, inventory tracking and accounting system. We also interviewed staff at grow and manufacturing facilities, touring them to deepen our understanding of how cannabis is grown and tracked in the supply chain. In addition, we interviewed software designers, entrepreneurs, investors, licensing consultants, and a reporter to get their perspective on the regulatory and market environment.

For the third and fourth visits, in 2016 and 2018, we talked to a broader range of stakeholders (such as scientists, compliance trainers, city attorneys, and a lobby group),

worthy of being carried out in practice by a reasonably prudent businessperson” (State of Colorado, 2012, p. 4).

³ Washington also legalized recreational cannabis on the same date but was months behind Colorado in achieving a functioning marketplace.

visited new regulators and edibles manufacturing facilities, and met again some of the people we had spoken with in our previous trips to confirm some of the themes we had been developing. These themes included how METRC encloses the cannabis market within the state of Colorado, but also how industry is allowed to input errors into METRC; how “illegal” plants are allowed into METRC and the market; and how regulators sought to change METRC’s functionality. These aspects of the market were not and are still not well-documented or publicly discussed, yet many of our informants returned to them when describing tensions within the market and the challenges of managing those tensions.

Over the course of our study, we spent a total of four weeks in Colorado conducting 56 interviews with government officials, consultants, investors, entrepreneurs, and compliance officers; we toured 2 grow facilities (one of them twice), 3 manufacturing facilities, and visited several dispensaries (see Appendix 1). We asked interviewees about their experiences regulating and being regulated through the state’s licensing and information system. Concurrently with these interviews and facility tours, we analyzed laws (e.g., House Bill 13-1317), regulations (e.g., Retail Marijuana Code), manuals (e.g., METRC’s user guide), and policy documents written by legislators, regulators, and consultants (e.g., the study “Market Size and Demand for Marijuana in Colorado”, see Orens et al., 2018). We analyzed these documents to understand some of the aspirations related to the market and how these were inscribed into the law, licensing and information systems central to cannabis regulation in Colorado. One exercise, for example, involved a comparison of each version of the Retail Marijuana Code to observe the changes in content and wording throughout time. Another exercise involved comparing Colorado’s Retail Marijuana Code with that of the state of Washington (which was also in the process of creating a legal recreational cannabis market), allowing us to identify potentially distinctive aspects of the regulatory approach. To get a better sense of how the technology functioned we participated in an online METRC webinar tutorial, where a member of METRC staff demonstrated to us what it can do and how regulators and industry use it to visualize and control the market.

We transcribed each interview and sent it back to the interviewees for their records and for them to comment or develop.⁴ Each one of us engaged with the transcripts, as well as

⁴ We have also sought to maintain some of the contacts we established by sharing preliminary findings and practitioner-oriented reports, and by asking for clarifications or for perspective on something we read in the news.

the laws, regulations, manuals, and policy documents, by inputting our suggestions for thematic codes based on the conceptual and empirical concerns we had been discussing throughout the research process. While the bulk of the analysis took place after our last field trip and before the submission of the first version of this manuscript, we cooperatively engaged with the material at different stages of the project. The field trips between 2015 and 2018 provided the opportunity to immerse ourselves in the field material and discuss different ways to explore the emergent dataset. Besides the field trips and periodic catch-up calls, we also had focused meetings, where we assessed progress with the research project, reviewed available materials, and planned future actions. For example, we met for four days in October 2016. During this period, we independently read all available material and jointly discussed emergent themes. The outcome was a nearly 80-page long document, which highlighted as a key emergent theme how METRC defines the boundaries of the legal market even if it has gaps (at the time conceptualized as “blind spots” following Dechow & Mouritsen, 2005) that allow illegal things and practices to be part of the market. Even if not entirely clear at the time, this intuition provided the foundation for the analysis presented in this paper.

Overall, the ultimate shape of the analysis presented in this article reflects our struggle with understanding our object of study. Regulations were constantly updated and the people and factors that we identified through our initial analysis of available material were changing. Throughout the entire research process, the market and METRC were remade and transformed, and in ways that were not closely connected with converting “knowledge into practices” (Millo & MacKenzie, 2009, p. 639). This motivated our interest in understanding the construction of the market as a matter of regulating flows and our use of an analytical approach to territorialization inspired by Deleuze and Guattari. In so doing, we began to understand how to theorize our object of study as a process driven not by entities (e.g., regulators, activists, entrepreneurs) or arenas (e.g., political debates about legalization, concerns with diversion of cannabis to neighboring states), but by flows that populate, intersect, and change the assemblages of which they are a part. Through several rounds of internal debates, we concluded that the two analytical categories or “processes” illustrated in the second section of this paper help to explain key dynamics in our material, and ultimately shed light on important aspects of the role of accounting, broadly defined, in the making of a new governable assemblage.

This analytical background informs our presentation of the field study material in the following sections. Following an overview of regulators' efforts to create a market with legal-administrative boundaries (see next section), we selectively “zoom in” (Nicolini, 2009) on parts of our material that, by focusing on flows and their regulation, enable us to bring to the fore how territorialization intensities vary and the implications of such variation.⁵ In so doing, we develop three empirical sections about the movement of specific components of the cannabis market assemblage: digital, material, and aspirational flows. Like the empirical analysis presented in recent accounting studies (see Martinez & Cooper, 2019; Ronzani & Gatzweiler, 2022), each of these empirical sections (each “zooming in”) provides a *snapshot* of the cannabis market assemblage, thereby capturing a particular component and territorializing process at a particular place and time. Doing so helps us address the core concerns motivating this paper, enriching our understanding about the dynamics of assemblage formation and the constitutive role of accounting and other devices in market making.

Assembling a cannabis market

In this section, we document regulators' initial efforts to create a legal-administrative boundary via a patient-caregiver model and a licensing system as well as the subsequent introduction of METRC. The starting point of our analysis is 2000, which is when the cultivation and consumption of medical cannabis became legal through a popular ballot vote. While this starting point precedes our field work, it helps to shed light on initial regulatory efforts which have significant implications for the legal (recreational and medicinal) cannabis markets at the end of the period covered by our field trips. By covering the period between 2000 and the end of our fieldwork in 2018, we can also capture the way in which the making of a legal market happens alongside the grey and black markets. This allows us to examine how illegal practices and materials may (or may not) flow into the cannabis market assemblage.

⁵ Here we follow Nicolini's (2009, p. 1402) suggestion that “zooming in” implies the use of theory “to bring to the fore certain aspects of the field material” (in our case, flows and territorializing processes involving boundaries and functionalities), “while pushing others into the background.” For example, we also collected extensive data about the risks posed by new products such as cannabis-infused edibles or the conflictual co-existence between new cannabis entrepreneurs and cannabis activists in a stigmatized industry.

*The patient-caregiver model*⁶

In 2000, Colorado voters passed popular ballot initiative Amendment 20, legalizing the cultivation and consumption of medicinal cannabis for “debilitating medical conditions.” This amendment mandated the state to make visible, demarcate, and regulate what had until this time existed only “in the shadows” (Palermo et al., 2016). Underground production processes, actors, and cannabis associated with illegality would be filtered into this medically mandated space to form, together with Colorado regulators, entrepreneurs, consumers, and activists, an emerging legal market assemblage. The regulatory boundary of such an assemblage is the state’s legal-administrative borders.

To regulate the content of this assemblage, from 2000 until 2011, state regulators promulgated what came to be known as the “patient-caregiver model” of cannabis regulation. This model encouraged once illegal cannabis growers and distributors to become “caregivers” by registering with and obtaining a license to grow and supply medical cannabis. It also encouraged cannabis users to become “patients” by obtaining a medical license or “red card” to receive cannabis as the basis for treatment of a medical condition. The supply of cannabis, the amount a caregiver could grow, was controlled by tying a plant to a patient. Caregivers could not provide cannabis to anyone who was not their patient. However, they could grow and supply up to six plants (or sometimes much more depending on their prescription) for each registered patient.

The caregiver model was an early attempt by regulators to assign functions to components within the emerging assemblage consistent with the medical principle. The functionality knob was set low relative to what would come and what was in theory available. Indicatively, what it meant to be a patient was only loosely defined and regulated. Patients could register at different caregiving locations; they could obtain a red card for a wide range of conditions; and ultimately they were able to be prescribed any number of plants. What it meant to be a caregiver, rather than a commercial entity, was likewise only loosely established. For example, caregivers could not accept payment for cannabis but could ask for donations and receive payments in other ways. Finally, the caregiver-patient model clarified little to nothing about dosage, serving size, potency, pesticide use, testing, etc. The CEO of a large edibles manufacturer and grow facility described the market at that time as the “wild west”: “back then it was really freaking scary because you didn’t know what you

⁶ This section is based on interview data alongside government reports.

should do, what you shouldn't do." Indicatively, one of the regulators we interviewed commented that the state allowed about 2,000 grower-distributors to operate pending licensure, something unthinkable in the regulatory model existing at the time of writing this paper.

The boundary knob was also set relatively low. The boundaries of the cannabis market assemblage were, as a result, highly porous; elements could flow in and out of the emerging market assemblage without much disruption. Indicatively, illegal and legal cannabis itself was indistinguishable. Allowing things and people to flow into and within the market's boundaries contributed to populating it in the first instance. However, it also contributed to the emergence of disruptions. Assigned only loose functions, caregivers started to operate more like businesses. Leveraging the six plant per patient cap on production, some operators assembled massive patient lists, building large operations and volumes of trade. Eventually these operators began to sell medical cannabis directly through storefronts in sometimes high-profile locations based on legally tenuous claims constituted by the patient-caregiver model (e.g., by maintaining a list of patients with verified red cards). These "dispensaries" disrupted the nascent market.⁷ In response to complaints, police raided some of the dispensaries and many more were cited for violating building and health codes, patient management, and other business regulations.

Through the patient-caregiver model, we can see how a market began to take shape through the management of flows. Boundaries were established around the state of Colorado where cannabis could be legally grown, distributed, and consumed under the caregiver principle. Functions were also ascribed to actors (patient-caregiver) and to cannabis (medicine). However, there were openings as regulators seemed to willingly allow some emerging market-like activity such as retail units selling cannabis to clients with medical cards. In the absence of clear-cut boundaries between illegal and legal cannabis-related market activities, police raids targeted those dispensaries that stood out as the ones that violated building and health codes, patient management, etc. These raids illustrated the turning up of the boundary knob, successfully filtering out those flows that threatened the emerging cannabis market assemblage, which at this point could be targeted by

⁷ A 2013 audit report explained that "Amendment 20 did not contemplate the possible existence of dispensaries" (Office of the State Auditor, 2013, p. 13). Because of this and cannabis' illegal status at the federal level, it was unclear what was legal or not—there were no codes governing various aspects of cannabis production, retail, etc. The Food and Drug Administration (FDA) and other federal regulatory agencies refused to provide standards for processes and production (for instance by approving pesticides) due to its illegal status.

prohibitionist associations and federal government interventions. Drawing on our conceptual coordinates, therefore, we start to see two territorializing processes at work, which regulators seek to adjust as if they have available two knobs that they can turn up or down. In the section that follows, we show how these efforts to manage flows continue with the enactment of a licensing system.

The licensing system

A back and forth between regulators and emerging market actors ultimately led the state to allow the sale of medicinal cannabis, but with tighter restrictions and regulations. These regulations were articulated in the Colorado Medical Marijuana Code, developed “for the purpose of regulating the cultivation, manufacture, distribution, and sale of medical marijuana” (State of Colorado, 2010, p. 28). These regulations developed a new set of designations and requirements for commercial enterprises to exist. They created a commercial licensing scheme consisting of three types of licenses for the production, processing, and sale of medicinal cannabis: medical marijuana center license; an optional premise cultivation license; and a medical marijuana-infused product-manufacturing license.

These efforts to ascribe functions consistent with the new medical-commercial regulatory principle reduced the perceived levels of risk associated with participation (as a consumer, investor, operator, etc.) and encouraged more people and things to flow into the emerging market. Mandating that operators be “commercial” and customers be “patients” went hand in hand with an exponential increase in the production, sale, and flow of cannabis. Cardholders increased from 1,955 in 2007 to 4,720 in 2008, rising to 32,000 by 2010 (Kelty, 2010, p. 1). Growing awareness of the size and scale of the market, however, raised fresh concerns about containment and diversion: the idea that people and products might flow into the hands of children, criminals, and neighboring states (see Finlaw & Brohl, 2013).

In the early 2010s, regulators and politicians in Colorado responded by formulating, as one senior regulator noted, three “guiding principles” for further regulation related to diversion: “keeping marijuana out of the hands of kids, keeping marijuana and proceeds out of the hands of criminals, and then keeping it out of other states.” These principles led regulators to mandate commercial enterprises to vertically integrate at least 70% of their

bought-in inventory, leading to what informants described as many “shotgun marriages” in the industry. They also began to envision possibilities for regulating not only market participants, but the cannabis itself. As the above-cited regulator put it: “we wanted to have the ability to monitor plants in the field.” She went on to say:

We wanted something, a tool that would give us the ability to go in there in an efficient way and do an inventory of the plants that were in there. [...] Something that was fairly automated, because you toured some cultivation facilities today, there’s a lot of plants in there.

This concern over the threat of diversion was reinforced by the publication of the so-called Cole Memo II, stating that the federal government would not intervene in state cannabis experiments if they took appropriate steps to prevent diversion.⁸ The focus on preventing diversion is related to the closed loop system requiring state regulators to evidence that cannabis cannot escape the legal market. As one former regulator explained:

You have to make sure that the cannabis that is cultivated in Colorado, is processed in Colorado, and it’s sold in Colorado, and consumed in Colorado. To do that, you have to have a very sophisticated method of track and trace.

To summarize, regulators turned up the functionality knob by developing a licensing system that assigned further functions to industry actors (one is a medical marijuana center; another is a medical marijuana-infused product-manufacturing establishment, etc.) and creating greater legal certainty for those willing to adopt such functions. This contributed to an increase in the flow of people and things willing to adopt those functions into the market, giving rise to concerns over flows problematized as diversion (cannabis flowing into other states, to minors, into the black market). It is at this point that we see the emergence of a full traceability ideal (Power, 2019) that complements earlier efforts to increase the intensities of territorialization in relation to the boundaries of the market (e.g., raids and vertical integration) and the functionalities of those who operate within such boundaries (e.g., licensed businesses). In the next section, we will turn to the development of this solution and its role in the territorialization of the cannabis market.

⁸ “In jurisdictions that have enacted laws legalizing marijuana in some form and that have also implemented strong and effective regulatory and enforcement systems to control the cultivation, distribution, sale, and possession of marijuana, conduct in compliance with those laws and regulations is less likely to threaten the federal priorities set forth above. Indeed, a robust system may affirmatively address those priorities by, for example, implementing effective measures to prevent diversion of marijuana outside of the regulated system and to other states, prohibiting access to marijuana by minors, and replacing an illicit marijuana trade that funds criminal enterprises with a tightly regulated market in which revenues are tracked and accounted for” (Cole, 2013, p. 3).

METRC and seed-to-sale tracking

In 2012, Colorado voters went again to the polls and amended the constitution (Amendment 64) to legalize the recreational use of cannabis. While regulators had begun working with a supply chain solutions company⁹ to develop the cannabis tracking system during the medicinal phase, it was during the legalization of recreational cannabis that tracking became a defining feature, the “backbone of Colorado’s regulatory structure” (Hudak, 2014, p. 679). A task force on the implementation of Amendment 64 was convened and, among its 58 recommendations, suggested: “As part of inventory control and tracking, the licensee must provide reconciliation of all inventory as it moves from cultivation to retailer, manufacturer to retailer, any transport to labs, etc.” (Finlaw & Brohl, 2013, p. 46). This was later codified by the Colorado Department of Revenue’s newly-created Marijuana Enforcement Division (MED), in the Retail Marijuana Code (1 CCR 212-2), which included Rule R 309– Retail Marijuana Establishments: Inventory Tracking Solution. The rule requires the establishment of:

a system that will allow the State Licensing Authority and the industry to jointly track Retail Marijuana and Retail Marijuana Product from either seed or immature plant stage until the Retail Marijuana or Retail Marijuana Product is sold to the customer or destroyed. (Colorado Department of Revenue, 2013, p. 43)

The state’s METRC¹⁰ system was officially launched in December 2013. METRC promises to track every product from seed-to-sale and create a “closed-loop” medical and recreational marijuana regulatory framework. It does so at the individual plant and then at batch levels. Each plant is assigned a Radio-Frequency Identification (RFID) tag that is created and attached when the plant becomes “viable” (i.e., eight inches in height or pot diameter). Information about the tag and the plant to which it refers is then entered and updated on the METRC website, recording the strain, its physical location specified by room, the stage of development of the plant (e.g., vegetative, flowering, and harvested), etc. Following drying, trimming, and other processing, the cannabis is then packaged, and a new RFID batch tag is ordered and affixed, recording the contents, weight, testing

⁹ As one regulator explains: “we got a response from a company called Franwell, who ultimately was the successful bidder, and they have a background in food supply management. Del Monte Foods down in Florida, they developed an RFID tracking system for them for when they’re growing spinach and they have an E. coli outbreak. It seemed to really lend itself well to what we were looking for.”

¹⁰ Initially called Marijuana Inventory Tracking System (MITS).

results, etc.; at this stage, the tagged package can be shipped to a licensed retailer for sale or a manufacturer for further processing.

Based on the design features and goals of METRC, we refer to METRC as an inventory *tracking* and *accounting* system. By tracking every product from seed to sale, METRC seemingly fulfills a full traceability ideal to achieve regulatory oversight and management control functions (Power, 2019). It provides senior regulators with a synoptic overview of market trends and the flow of cannabis across different entities and through different grow phases. A consultant from the company that developed METRC emphasizes how regulators can drill down into METRC's data to reconstruct a plant's audit trail, thus providing granular information about cannabis in addition to a synoptic overview of the market¹¹:

Here are all my vegging plants by strain, and I'll show you the beauty of [it], as accountants you know about drill down, right? Kind of an audit trail. This is showing that it was planted on this date, the plant moved, and [the tag was] attached. This is a unique identifying number that will not be replicated, so each plant gets a unique identifier.

It also provides a room-by-room account of the plants and products within licensed facilities for enforcement officers to use as the basis of their inspection. As a regulator explained:

They can, based on not really a schedule, but we do it based on random sampling. We'll go out to a particular business, a cultivation for example. What they can do is they can download what is in the METRC system for that particular business on a room-by-room basis into a handheld device and go out there and actually scan those rooms to make sure that those plants are there and nothing more and nothing less.

Such an inventory tracking and accounting system, in combination with existing regulatory tools such as licensing, involves regulators turning up the boundary and the functionality knobs. The system provides a boundary that is in principle impermeable. For one senior

¹¹ Subsequent field visits and public documents (e.g., Brown, 2019; Orens et al., 2018) suggest that state regulators leveraged the extensive set of METRC's data points to account and control what happens in the legal market. For example, in 2019, the MED used METRC data to identify and prioritize investigations of marijuana businesses that are outliers with respect to industry norms (see Brown, 2019). Outliers can be identified based on a comparison between data on current crops (e.g., weight of flower/buds, growth times, waste, production yields) against historical data or similar types of businesses. Or, given that licensees can adjust package weights in METRC for different reasons (e.g., original weight was recorded incorrectly due to human error, scale issues, moisture loss), the MED can identify weight adjustments that are outside of expected and acceptable ranges.

MED regulator, METRC's tracking functionality is essential to control for diversion and to keep plants within the regulatory domain:

And, that's the big concern that everyone in the state of Colorado who is part of the regulatory program has, which is to prevent diversion [...]. You want to make sure it's not being sold out the back door to go to another state. We want to make sure it's not being sold to someone who's under 21. [...] So, having a very robust system, that does it with RFID technology, that you can tell exactly where that plant is, even in route, is a really important thing.

Moreover, the tag assigns a function to each of the plants (see Figure 1). If a plant has a blue tag, it can be used for recreational purposes; if a plant has a yellow tag, it can be used for medicinal purposes; if it has no tag or the tag does not match its identity on the system (e.g., the plant is in the wrong place), it is illegal and part of the black market. These tags, alongside their corresponding digital trace, populate the cannabis market assemblage with material and digital content and contribute to establishing its boundaries. With METRC, the correspondence between people and things in the digital and physical territories is what defines what is legal or illegal. If a plant exists in a facility but not in METRC, it is illegal. As one METRC expert noted with amusement:

One of the funniest things I've ever read in the past four or five months was [that] law enforcement in Oregon can't tell the difference between regulated and unregulated marijuana [...] have you ever heard of a METRC tag?

[Insert Figure 1 about here]

In so doing, METRC complements earlier regulatory efforts by creating boundaries between what is legal and what is illegal and by assigning functions to the content of the cannabis market assemblage. In addition, the combination of METRC and pre-existing tools such as licensing also contributes to more explicitly regulating not only the boundaries and the content of the cannabis market assemblage, but also movements within it. Inventory can only physically flow between the companies available through the METRC drop list of licensees. METRC's graphical user interface thus makes explicit the possible physical pathways that legal inventory can take within the market. To ship cannabis from one establishment to another, businesses need to create and print a "travel manifest" (see Figure 2) containing information about the amount and type of product, the date and time, the driver's identification, and the route to be driven. As shown in the following quotes, taken from our conversations with a compliance training expert and a

regulator, respectively, METRC and METRC-generated travel manifests define very strictly how, where, and when cannabis can circulate:

In METRC the MIP [Marijuana-infused Products licensee] is supposed to put detailed instruction about the delivery. They're supposed to say it's leaving here, and they're going to drive down this street, turn here, and turn there.

[...] if a vehicle is transporting cannabis from the cultivation to the store, in the system, the METRC generated manifest, it will identify the vehicle that's doing the transport, the driver, all of the licensing information for the vehicle and the driver. It will also identify exactly how much cannabis was in that vehicle, how it's packaged and where it's going to.

[Insert Figure 2 about here]

To conclude, through METRC, regulators turn up both territorialization knobs, seeking to manage flows into and within the regulated market space (e.g., it is possible to only distribute to licensed companies *in* METRC) and to define legitimate commercial entities (one is a grow operation, a retailer, or manufacturer) and plants (one is medical or recreational). These interventions reinforce one another. If a plant does not have a tag, if a business does not have a license, or if they operate differently from what the license specifies, then they are not within the boundaries of the legal market. These relational properties enable regulators to start designing an array of data analytics, indicators, red flags, and their textual representations to see and control the market. For example, regulators can check if tags match with physical plants, if the number of plants suddenly increases, or if there is no sign of data input into METRC. On this basis, the schematic chronology of market creation efforts, from the patient-caregiver model to METRC, presented in this section reveals (a) an intensification of territorialization in relation to both boundaries and functionalities; (b) that territorialization intensities relate to each other; and c) relate also but not predictably to regulators' market-making efforts. The next section aims to nuance this seemingly simple story of increased territorialization intensities. We seek to deepen and gradualise our understanding of territorialization dynamics by "zooming in" (Nicolini, 2009) on three types of flows which reflect the movement of data, things, and ideas into, out of, and within the market assemblage.

METRC and the regulation of territorialization intensities

In this section, we “zoom in” on three kinds of flows in the cannabis market assemblage to shed light on how METRC helps to articulate varying degrees of territorialization intensities in the cannabis market. Through METRC’s design, use, and adjustments, regulators attempt to restrict or enable flows across boundaries and assign more or less stable and clear-cut functionalities to the flows that make it through such boundaries at the digital (data inputs), material (plants/genetics), and aspirational (desire for functionality) dimensions of the market assemblage. As anticipated in the section illustrating our data analysis approach, the following sections can be seen as three snapshots of the cannabis market assemblage. While these three snapshots do not aim to present a linear, sequential narrative, their presentation sequence matters. For example, we show how ways to manage digital flows via an “add strain” functionality in METRC (first snapshot) helps to understand what happens to material flows (second snapshot). Likewise, the analysis of aspirational flows (third snapshot) adds nuance to some of the dynamics illustrated in the analysis of digital flows (first snapshot). Collectively these three empirical accounts of different types of flows add weight to our core claim that territorialization intensities vary across the cannabis market assemblage and over time; and also how such variations can be understood through an analysis of adjustments made to two territorializing processes.

While the way in which we address these dynamics is inspired by the conceptual repertoire illustrated in Section 2 and the paper’s academic concerns, “zooming in” on each one of the three flows also helps to better understand how, by adjusting the two knobs, with the effect of modulating territorialization intensities, regulators address a very practical tension that is common to many regulatory interventions. This tension revolves around the state mandate to protect the health and safety of its citizens, while not putting “unreasonably impracticable” limits on the commercial sector. As one MED regulator notes, “we cannot promulgate rules that are essentially so onerous that it’s so expensive for a business to actually comply. We have a lot of balancing tests that we’re dealing with all the way through.” In short, the next three sections show evidence of such a balancing act.

Digital flows

As we learned above, one way METRC can be used to increase the intensity of territorialization is by containing the flow of products that exist within the state's boundaries. METRC, for instance, restricts commercial connections to licensed facilities through the drop menu and provides users with templates they must fill with information on the number of plants per room, the number of recreational or medicinal plants, the number of packages, the plant's strain, etc. While METRC territorializes by inscribing pathways and regulating connections among entities, it provides fewer constraints in relation to the content uploaded to its database. Specifically, METRC does not provide industry users with parameters that bound or alert them when they have inputted inconsistent information. Borrowing from our conceptual lenses, the boundary knob is thus set relatively low for digital flows.

Industry actors, regulators, and METRC experts draw attention to the fact that METRC specifically enables *data input errors*. While there are heavily formatted templates ensuring a certain way of inputting data (dates, plant numbers, yields, etc. must be recorded according to a certain format e.g., mm/dd/yyyy), they can nevertheless be, and are, inputted incorrectly by operators. For instance, in the example above, an operator can incorrectly input 10/05/2020 when they intend to describe May 10th, 2020. These are what we and our informants describe as data input errors. This is a known problem in corporate information and ERP systems (see Newman & Westrup, 2005, p. 264; Scapens & Jazayeri, 2003, p. 214), and could be solved by adjusting the design architecture of METRC (for instance by requiring users to select a date on a calendar). However, allowing this incorrect data to show up in METRC is an intentional design feature of the system. The key rationale, according to the regulators that we met in 2015 and 2016, is that, in the early phases of the market, METRC operated as a significant compliance hurdle, which helps to filter out businesses that, as one MED regulator put it, “don't have the aptitude to be comprehensively regulated like we do.” The regulator explained that the rate of data input errors could signal “businesses that are trying, and have tried, to just go as far as they could without being compliant.” On the other hand, a lower rate of data input error could be a signal of businesses that are “serious about compliance” and spend “more of their personnel resources on compliance.”

These regulatory expectations find a confirmation in facilities' “compliance officers” who remarked with pride how they had up to 8% of total company staff dedicated to

compliance related activities, including keeping METRC's data correct and up to date. In general, the regulators' approach towards input errors signaled to companies the need to invest in compliance to input data that precisely corresponds with the physical manufacturing and retailing worlds. For example, one cannabis consultant stated:

You don't always know if you're right. You won't always know [...] You can enter amounts in pounds or grams or ounces or things, and see a lot of wrong units, you're like: "Oh, I think you meant grams." You know what I mean? You see a lot of that. You see on some potency testing, you'll see results that are 45% and you're like: "I don't think that's right."

For the CEO of an edibles manufacturer and grow facility:

You have to be able to identify it, because human error occurs, you can't help it. A friend of mine entered 450 pounds rather than grams and had a lot of trouble for it. The MED said, "you're missing 400 pounds of marijuana, where the hell is it?" And it was a data entry error. And so, you can really cause a lot of headaches for yourself.

Irregular data flow is not only about input errors, though. It also has to do with the way in which regulators define and communicate the boundaries of anomalous data, especially in terms of what will constitute "non-compliance" or generate "red flags." Red flags may be raised for data anomalies: inputted quantities that are not consistent with the regulators' own records. One regulator gave a concrete example of what this looks like:

If they [growers' records] have a 1,800-plant count, we're not going to stop counting at 1,800 in the system so they can't put in any more. We're going to let them put in as many plants as they have RFID tags to put into the system. If they end up with 2,200, well, that's a problem. Then we go out there and we take a look at it.

Because data entry errors are possible, and even according to some unavoidable, users do not know whether or not their upload will trigger red flags. It is a regulatory strategy to make it possible for regulated entities to include data input errors or anomalous data, as argued by one senior MED regulator:

One of the things is that this is a database that we want to know what they are actually doing as opposed to not letting them do things that are not allowable. Because if we don't allow things that are not allowable, if that makes any sense, then they'll just plug in. Everything that they do will always look as if it's compliant. Then the power of that system will be lost. What we have to do is allow them to put in the data as they are actually doing it, so that we can go in and take a look.

Industry users populate the METRC database and make mistakes, which they may or may

not rectify. All of which is captured by the system. But while METRC can track and record everything, the templates enable certain data irregularities to flow into the system. As a result, users cannot know with certainty when their data, and their operations, may trigger inspections and investigations. For a METRC expert who works closely with state regulators, regulators want to see “mistakes”:

That’s exactly right because they [regulators] *want to see the mistake*. They want them ... That’s why METRC lets you make mistakes. It lets you make errors. I’ll tell you one thing that the MED shot down. God, this is awesome! Everybody [in industry] said, “we want to know when we’re violating. We want to know when we’re violating regulations.” MED was like, “no, no. We don’t want you to see that. We want you to make the mistake and correct it, that’s all.” That was one [suggestion] that was shot down. [The system is setup] *for us to let you go outside of the regulation*. Let’s see how far you’ll go. That sends the alert, generates the investigation or phone call or whatever. (Emphasis added)

As the expert implies, for regulators these openings in the information system enable users to input information errors and trigger red flags as they may be evidence of more sanctionable flows such as actual plants flowing from or into the black market. These data flows are intensely territorialized by the state and given a functionality: a rich data set that forms part of a system of alerts and new grow modalities in the marketplace. For example, in our more recent field visit we learned about how alert systems became embedded in the regulatory and inspection work thanks to automatic notifications. One former MED’s law enforcement officer, with experience in field inspections, suggested that:

[Take] an average sales figure per month ...and all the sudden we’ve got a big spike. What they’ve [MED] done is they put some things into the system, so it gives them an automatic notification. They get an email. Let’s say a licensee destroys 1,000 plants at their cultivation facility. They’re going to get an email notification.

To summarize, by “zooming in” on digital flows, we further show how it is useful to distinguish between different territorializing processes, and the way in which they lead to different levels of territorialization intensities. While METRC increases territorialization intensity by ascribing functions and containing the flow of products within the state’s boundaries (see previous section), we also learn that, through METRC, regulators can turn down the boundary knob to let irregular data flows into the assemblage; they then can turn the functionality-ascribing knob up, making this data useful for regulatory and control purposes. That is, the input errors and potentially anomalous data flows that deviate from the norm in a setting (e.g., manufacturing facility) are territorialized elsewhere (e.g., regulators’ METRC’s database) and given a new functionality (e.g., a signal of lack of

commitment to compliance; a red flag for illegal practices; or a sign of entrepreneurial practices and innovation). We learn further that intensity is not a static feature specific to certain parts of the cannabis market assemblage (e.g., in this case METRC's design) nor the sole domain of state regulators, but a property of the relation between regulators and regulated entities. Regulated entities, and not the regulators, wanted METRC's boundary between regular and irregular data to be more explicit: they want to be alerted of when they "go outside of the regulation." Importantly, this demand is not for the assemblage as a whole, but for a specific component (data input templates). In the following section, we further provide evidence about such varying territorialization intensities, focusing on material elements such as cannabis plants.

Material flows

State regulators openly acknowledged what they referred to as the "original sin" that made the market possible in the first place. Put simply, cannabis plants had to come from somewhere outside of the closed-loop system. As stated by one senior MED regulator:

When the market was getting started, systems set in place, growers had to get their plants from somewhere to get it started. They got it from magic. I'm sorry. Magic beans. Sorry. It was magic marijuana. Nobody knows where it came. Of course, it came from some place illegal.... I've talked to the folks in Alaska, and that's what they said, too, is that it's one of those things. You decriminalize it and make it legal, and nobody talks about where those original plants came from. I guess they just appear magically. That's why I said that. I said it tongue in cheek. If you're going to ask us, were they unlawful at the time that they first started, possibly.

This meant, at least at the early stages of the cannabis market, that the boundary knob was set relatively low. The boundaries of the cannabis market assemblage had to be made permeable to allow these "magic beans" into the system. METRC has been designed in a way to accommodate this practical need for more permeable boundaries at the early stages of the cannabis plants' lifecycle. The first plants had to come from somewhere and the information system was designed with a gap where this insertion of illegal plants into the legal market leaves no trace. In Colorado, the insertion of new plants happens early in the supply chain, between the mother plant and the clones, a space where there is no audit trail (tag) tying clones to the mother plant. In between the moment clones are clipped from the mother plant and the moment they become "viable," there is a short period where

clones are placed in batches without a METRC tag. At this stage, growers can introduce cloned plants from outside and place them as a batch, which, once they reach the viable stage, can be tagged like any other plant. The compliance officer at a grow facility put it this way when asked about the paper trail connecting clones to the mother plant:

Well, the system ... Well, no. There's no ... They chose... *this was a fundamental decision* from the state, where they chose to only track a plant once it's off the ... That connection, right there [between the mother plant and the clone tray/batch], they don't track. This plant is born out of thin air. (Emphasis added)

This quote shows vividly a feature of METRC that also makes boundaries more permeable and enables the flow of cannabis material into the market. This seemingly intentional feature (e.g., “a fundamental decision”) exemplifies that the boundary knob was turned down in between the mother plant and the clones. As an outcome, the “seed-to-sale” closed-loop inventory tracking information system at the heart of the regulatory effort contains a space with low territorialization intensity, allowing components from the illegal/grey market to flow in.

This permeability in both METRC's and the market's boundaries did not change with the emergence of the recreational market. This gap, which seemed necessary for the initial creation of the market, was left open. A journalist-consultant in Colorado that specializes in the cannabis market noted the uniqueness of the METRC regulatory gap and its continued existence at the time of the interview, which took place in November 2015:

That's kind of the weird elephant in the room with regulation, it is where do the plants come from originally? There was a lot of it where they were like, “well, all these things are here, people have these grows. We just have to be like okay guys, now you're legal now and just forget about all that other shit.” *Stuff is still coming in.* Stuff still comes in, plants come in from growers who grow at home and do some testing at home and bring plants in. They just come in. (Emphasis added)

The quote above shows that there are flows of material from the illegal/grey markets “still coming in.” These flows are important, according to commercial operators, for the market's viability. One compliance officer explained, “legally, new genetics shouldn't come from the outside anymore because you can't buy from the outside.” But they did come in to allow the genetic material to be refreshed and remain competitive. Indicatively, popular strains from other states—for instance, winners of annual Cannabis Cup competitions—continued to make their way from the illegal into the legal market. Illegal material outside of the supposedly closed-loop system provided flows of genetic material to the emerging market. For a consultant (grower and compliance expert):

There are loopholes and I think some specific ways that the black and legal market informed each other, probably more in the early days of legalization, I think with things like strain popularity. [...] you know you have these competitions like the Cannabis Cups and certain varieties would win awards and then there would be more demand for that.

Regulators emphasized how the legal market had to offer a range of products that, for whatever reason (e.g., award winning strains or potency levels), was appealing to different segments of consumers in the market. Otherwise, the risk was that consumers would source cannabis from the black or grey markets. During a workshop organized by the MED in 2014 to collect the views regarding key issues in the emerging market from market participants, medical experts, legislators, and other members of civil society, several industry actors suggested that consumers are willing to purchase products elsewhere if they cannot find them in the legal market assemblage:

They have an available illegal marketplace where there are no regulations, where there are no checks and balances, and where there is no safety. [They] just go to Craigslist¹² and get anything that they want. (Excerpt of the transcript of a meeting of the “Retail Marijuana Product Potency and Serving Size Workgroup” see Brohl, 2015).

In contrast, whatever entered METRC’s closed loop system could be territorialized as a legal product, by turning up the functionality knob. Cannabis is adorned with METRC’s tags and becomes amenable to inspection via RFID guns so that they could be tracked and tested. METRC facilitates the insertion of new products, which are potentially more commercially palatable, as there is no regulation blocking the creation of a new strain feature in the system. As simply put by a compliance officer, “you can go into METRC and create add strains, you know?” On this basis, like the digital data input errors and anomalies discussed in the previous section, once materials with dubious origins flow into METRC, they can be assigned a function (legal/recreational). That is, the intersections between the digital (e.g., “add strain” METRC’s functionalities) and material components (e.g., tags, travel manifests) of the cannabis market assemblage contribute to assigning a function and legal identity to the once illegal material.

To summarize, as in the previous section, our theoretical approach helps to foreground the interplay between different territorializing processes. Turning the boundary knob down in one location (between mother plant and batch) allows materials with dubious

¹² Craigslist (an American classified advertisements website) was frequently mentioned as the “new black market,” where any kind of cannabis products can be found. A representative of cannabis operators emphasized how this new black market “truly isn’t regulated and much more dangerous.”

origins to flow in. At such point, the boundary knob and the functionality knob are turned back up. The flow of illegal clones is territorialized by adorning them with tags and manifesting them in the METRC database through its “adding new strain” feature. Illegal clones are tagged as medicinal or recreational plants on their way down the supply chain. The potential threat posed by illegal plants is territorialized as plants that make both the market and the regulatory experiment viable. Threatening flows become useful content. In addition, as shown by the fact that the gap has been left open for some time, it seems that without such gaps, and the ability to open and close them, the market for legal cannabis would find it difficult to compete against the illegal one. While our field work stopped at a point in which the gap had been closed, some interviewees speculated that this outcome may be temporary, suggesting a possible further adjustment in the boundary-restricting territorializing process.¹³ This possibility reinforces our claim that territorialization intensities vary not only in a part of the assemblage, but also over time.

Aspirational flows

In this final section, we extend our analysis by “zooming in” on METRC and its relationship to the ideals and aspirations that underlie regulatory efforts, and more generally the dynamics of the cannabis market assemblage. As anticipated in the previous sections, the design and the technical features of METRC are intertwined with a specific way of conceptualizing the governance and control of the cannabis market. This is based on an ideal of full traceability (Power, 2019; see also Pflueger et al., 2019), according to which cannabis is something to be tracked and contained as a closed-loop system, through a technological solution that can provide evidence about where individual products are at each stage of the production process and how they are transformed from seed-to-sale.

In the early stages of the recreational cannabis market, these ideals permeated how the functionalities and the boundaries of METRC were conceptualized by regulators and how METRC was perceived and understood by operators. In terms of functionalities, it was understood, from its earliest use, that METRC was not designed for firms to manage their operations (as payroll, grow management, customer accounting, inventory management,

¹³ For instance, a METRC expert noted: “because you can only, just like any other plant type on the planet, you can only cross so many times. And you can only bring clones out so many times before the genetic material just breaks down. At some point, there has to be a way that METRC opens the door to breeders ... it has to happen.”

point-of-sale, etc. would). As a MED regulator put it: “the important piece to understand about METRC is it’s really designed for us. It’s designed for us to monitor the industry.” One inventory tracking software expert emphasized how the state is looking for “key traceability issues” when they refer to seed-to-sale tracking systems, while operators may be looking for “in-depth management tools.” Geared strictly toward this task, METRC does not have the functionality to operate as a point-of-sale system. For the same expert:

It will keep track of plants, it will keep track of movement, but if I try to say, “hey, [name of researcher omitted], you’re coming in.” I can’t register you as a patient, I can’t find your sales history, I can’t make a sale to you, there’s no point-of-sale functionality.

In relation to boundaries, METRC was closed to industry’s aspirations for integration, communication between systems, and business intelligence. It was an isolationist system that focused on making operable an ideal of regulatory governance through full traceability for the exclusive use of regulators. While firms used grow management, manufacturing, sales, and taxation software alongside METRC to fulfil those operational and commercial functionalities, they could not integrate their in-house commercial software into the METRC system. The lack of integration with other commercial and operational software required that users input the same data twice and continuously reconcile the content in their in-house system with the contents in METRC. Operators fiercely criticized these design choices, as METRC provided limited functionality for basic business processes. One software expert stated that he told senior regulators: “it’s absolutely stupid and it’s a major design flaw and you need to address this,” but that he was “completely ignored.” Another software expert explained:

There was no reconciliation feature. There’s no reporting, there’s no exporting from their system. I can’t see, as an operator, how many plants am I liable for in your state system so that I can compare those same number of plants within my system and say, “yeah they match, I’m now good.” I don’t have to find out which plant didn’t make it, or how many cookies are in each system, or how many patients are in each system. I had to manually go one by one and look at each screen in order to reconcile this.

Regulators referred to security concerns as a reason why METRC was designed to keep business-friendly functionalities out of the system. For them, opening it up to industry could potentially threaten the integrity of the system and its use as a regulatory device (Williams, 2013). This explanation was aggressively contested by industry experts. One software expert stated, “they’re idiots,” and further explained:

It's the whole CIA concept. CIA from an information systems point of view, Confidentiality, Integrity, and Availability of systems. It's a security tenant. If somehow I can get into this system and change it or change it between the time it leaves the point of entry to finally get into their system, [...] then that undermines the integrity piece. If I get into their system from a security point of view and put in some kind of bug, then that can undermine both the ability of their system and the confidentiality of their system. They're so scared of that particular tenant, the security tenant, that they don't want to have an API,¹⁴ which is absolutely stupid. If Visa [or] MasterCard can do it, then why can't you. There's no reason to do this.

In addition to security concerns, the regulators' reluctance to open up METRC to other uses also appeared driven by a cautious approach, which, in the early stages of the cannabis market, was primarily aimed towards understanding what METRC might be capable of doing. As put by one regulator, "we're really just starting to get our arms around the power of all this data that's in the system."

Regardless of the specific motivations for keeping METRC a closed system, one important consequence was that ideals and aspirations of data-driven business optimization were largely kept out from the cannabis market assemblage to the frustration of many. Despite the granular market-level data being generated by METRC, there was almost no public data about customers, products, grow management, etc. As the CEO of a large cannabis incubator explained:

I would say there is very little knowledge of the industry in the industry. I don't know of a journal that even comes close to presenting good data on the industry. The ArcView market research report is one of the best, and it is, in terms of accuracy, you're probably up to 60 to 80 percent accuracy, which is not great for business.

As the same CEO explained further:

One of our portfolio companies [name withheld] will be the first company to market with point-of-sale data on dispensary sales in Colorado. Think how fundamental that missing element is. If you were to say, right now, what is the best-selling edible in Colorado, you couldn't find it. Nobody knows the best-selling edible. *It's fundamentally a broken information system.* (Emphasis added)

In 2015, however, regulators indicated a "second phase" in their development of METRC. This suggested an adjustment of the boundary and functionality knobs, in an attempt to

¹⁴ An API (Application Programming Interface) facilitates communication between different systems.

allow more business-friendly aspirations to flow into the market assemblage. One senior regulator explained to us:

We're now starting to move into a second phase of development. That is, to look for ways for it to be more user friendly for the industry and for the industry to get more benefits out of the system. We're currently in the process of developing a user group that will be comprised of licensees from the industry, third party point-of-sale system vendors, development of an API so that the third-party vendor systems can communicate with METRC seamlessly. We're really getting into that second phase. Our first phase was, what kind of enforcement tools do we have? Now it makes sense. What types of business-friendly things can we do in the system to make it more valuable to the industry?

These were not just technical changes. Rather they reflect the way in which the design of METRC's software architecture became animated by different regulatory aspirations. Similar to accounting research on ERPs showing how the design and use of corporate information systems is contingent upon visions such as becoming a "world class manufacturer" or "continuous improvement" (Dechow & Mouritsen, 2005; Pollock & Williams, 2008), Colorado state regulators indicated their willingness to loosen their ideal of METRC as their "own" regulatory device. Instead, and acknowledging their mandate to avoid "unreasonable impracticable" burdens on the industry, they appeared willing to let in aspirations to have a data-driven market in Colorado.

In our third (2016) and fourth (2018) field trips, we learned how regulators, opening up METRC to these ideas, began to turn back down the boundary knob in two ways. Firstly, user-friendly functionalities were added to METRC that would make it more like an enterprise-wide information and accounting system (similar to commercial ERP solutions). This included, for instance, the ability to report plant waste and nutrient input. Secondly, an API was developed allowing METRC to integrate with other approved third-party commercial software vendors. The added functionalities enabled by the API include: third party Point-of-Sale (POS) systems, inventory tracking systems used by licensees, and other systems that store/manage cannabis information (e.g., License and Case Management systems). In brief, the main goal, as of 2016, was to make METRC a regulatory device which approved vendors can use more comprehensively, developing and adding operational and sales functionalities.

These changes, and the shift in thinking, suggested a willingness to let technology-related industry aspirations to flow into METRC and, consequently, into the cannabis market

assemblage. For MED regulators these changes might imply that METRC would “lose its identity.” As one regulator recounted:

There was always a concern that we lose identity or the licensees lose identity with METRC because METRC is the system of record and you can use another system but [you] understand we’re going to hold you accountable for what you put into METRC.

Without one authoritative record of its content, the market could become permeable to all kinds of new and uncontrollable flows. Turning down the boundary knob enabled industry aspirations to flow into the market through METRC (through the API, for example), disrupting the boundaries and the control functionalities assigned to METRC in an earlier phase. Importantly, however, regulators again envisioned and attempted to further territorialize these potentially disruptive aspirational flows elsewhere. One senior state cannabis regulator explained their thinking as follows: “just making it a more useful system [for industry] will make it a more powerful tool for the regulators anyway.” Another expanded on this by saying that these initiatives were:

Ways for them [operators] to be more efficient, then ultimately, they would be more compliant ... A great example was the API where they were doing a lot of double entry. At the beginning, they were doing some double entry or they were creating a report and they were importing some data. There was some potential there for the data to start to degrade because it was not the original data that’s getting moved around like it would be with an API.

Another added “the more efficient we can make it for the businesses to enter data into the system of record, the more likely it is to be accurate.” For regulators, opening up METRC helps them to see further into the mechanisms of the market and operations of the regulated entities. The feature may reduce the ability for the MED to see the propensities of operators to enter data incorrectly (a filtering feature in the early days of the market, but less so over time as “improper” content has been filtered out).¹⁵ However, it is designed to let in the industry’s concern about data irregularities (see *digital flows*) and their aspiration for integration; in so doing, these industry aspirations are incorporated into the state’s own aspirations and capabilities for monitoring and control.

To conclude, METRC was designed as a closed system for regulators to realize their

¹⁵ One operator noted that the data entry requirements of METRC filtered out many participants: “[METRC] played a very very pivotal role in helping people who may have been less than transparent in their previous career in the cannabis industry; now [they] are fully transparent. I think that’s been very beneficial [...] So now the industry seems to be weeded down to business folks and a lot of people that weren’t business-minded or weren’t really in it for business gave up, sold out, closed down, went to jail.”

aspirations for control and tracking of cannabis from seed or immature plant to point of sale. The system, designed this way, contributed toward keeping industry aspirations for a data-driven business approach out of the boundaries of the cannabis market assemblage. Over time, however, the boundary knob was adjusted (e.g., turned down), enabling the addition of business-friendly operational modules and API to METRC. Through this redesign, industry's potentially threatening aspirations, affecting data security and METRC's identity as the key system of record, could flow into METRC and the market. These threatening flows, though, were harnessed by regulators by turning up the functionality knob, assigning them another functionality: as flows that provide more in-depth knowledge of business processes and increase voluntary compliance by making it easy to insert data and give more stability to the system (Dambrin & Robson, 2011). Through this, METRC emerged as a device that extends deeper into the firms' sale and operational systems.

Discussion

Taking inspiration from the work of Deleuze and Guattari, our analysis distinguishes between two territorializing processes: one related to creating boundaries that regulate the flow of people, things, and ideas; another one related to assigning functions to what flows into, and out of, these boundaries. Through DeLanda's knobs metaphor, we show how regulators attempt to adjust these processes as if they have available two knobs that they can turn up, turn down, and relationally adjust to vary the level of territorialization intensity over time and across the cannabis market assemblage. In so doing, our analysis reveals empirical themes that are familiar to scholars interested in the dynamics of accounting as a social practice. For example, it provides insights regarding the unstable and changing nature of accounting and performance measurement systems (e.g., Chua, 1995; Dambrin & Robson, 2011; Quattrone & Hopper, 2001). It also sheds light on the coordination aspirations, data entry errors, and visualization gaps documented in research on ERP systems (e.g., Dechow & Mouritsen, 2005; Quattrone & Hopper, 2005; Scapens & Jazayeri, 2003). Bearing in mind these empirical similarities, in the next sections we seek to exploit our core notion of territorialization intensities to develop three more general theoretical contributions, which refer to our understanding of assemblage formation dynamics, the role of actors and agency in such dynamics and, finally, the role of accounting and other devices in the making of markets.

Territorialization intensities and assemblage formation

Our observations regarding territorialization intensities have implications for our understanding of the dynamics of assemblage formation—a long standing theme in accounting research concerned with the governing of abstract and physical spaces (Martinez & Cooper, 2017, 2019; Miller, 2014; Miller & O’ Leary, 1994; Neu et al., 2009). Specifically, by “zooming in” on three flows, we provide evidence of how assemblage formation dynamics are sustained by adjusting territorialization intensities via distinct, albeit intertwined, processes.

In the two sections on digital and material flows, we observe a similar dynamic where the boundaries of the cannabis market assemblages are made permeable to allow anomalous flows (e.g., data input errors and “magic beans”) into the cannabis market. In both cases, these flows are facilitated by METRC’s design features such as flexible data input templates (digital flows) and the mother plant-clone gap (material flows). Subsequently, we show in both settings an increase in territorialization intensity in relation to the functionality-ascribing process. Input errors and anomalous data flows tend to indicate a lack of commitment to compliance; a red flag for illegal practices; or evidence of entrepreneurial practices and innovation. “Magic beans” become legal cannabis via the “add new strain” feature in METRC as well as through functionality-ascribing devices such as tags (defining medicinal vs. recreational cannabis) and travel manifests (defining cannabis that can or cannot travel between facilities).

In our analysis of aspirational flows, we show how, initially, potentially threatening flows such as industry aspirations for more user-friendly functionalities and for integration with third-party commercial software vendors are blocked. This makes METRC impermeable to industries’ aspirations for integration, communication between systems, and business intelligence. Later, however, regulators open the software infrastructure to user-friendly functionalities, allowing potentially threatening industry-aspirational flows into METRC. These are then made useful by regulators by assigning them another functionality: as flows that provide regulators with in-depth knowledge of business operations and increase voluntary compliance.

While the focus on two types of territorialization intensities depends on our specific case-study setting, the interactions between them suggest that the properties and stability of a new governable assemblage are contingent, among other things, not only on how different

elements are arranged and “act on each other” (Martinez & Cooper, 2019, p. 3), but also on the means through which these components are made to act on one another, that is, through the boundary-opening/restricting or functionality-ascribing processes. In our setting, we show how the lowering-to-then-turn-up relations between two territorializing processes, and the consequent variation in intensities, are constitutive and generative of a market with more data, a market with more variety of cannabis strains, and a regulatory body with deep visibility into firms’ operations.

This general intuition—that the mutual adjustment of different territorialization intensities helps us to understand the way in which a new entity is assembled and made governable—encourages the exploration of additional relational features of territorialization. The first one refers to the way in which the interactions between territorializing processes become constitutive of key aspects of the market depending on how they link up different types of flows. In our case-study setting, not only do the boundary opening/restricting and functionality-ascribing processes interact, but they tend to affect one another depending on how they act on digital, material, and aspirational flows. For example, by allowing irregular data and industry aspirations (digital and aspirational flows) to flow into the market assemblage, the cannabis market assemblage is increasingly saturated with accounting and performance measurement devices, which enhance understanding of cannabis (material flows).

The second area of exploration refers to the temporal sequence through which territorializing processes relate one to another. The three sections on digital, material and aspirational flows show the importance of allowing certain flows in, *at some point in time*, but *simultaneously* blocking others. For example, illegal plants (material flows) and anomalous data (digital flows) are allowed into the assemblage, but this happens in a context in which the industry aspirations for a more user-friendly and open information system are blocked (aspirational flows). It is only in a *subsequent* period that industry aspirations are allowed into the market assemblage, once digital and material flows have been more intensely territorialized by turning up the functionality-ascribing knob. On this basis, our analysis suggests that this way of varying the territorialization intensities of different parts of an assemblage *over time* helps to maintain control of a heterogenous and emerging assemblage of things, practices, people, and ideas.

To summarize, the study presented in this paper helps us to better understand territorialization dynamics and their effects on assemblage formation. We consider this an

important area of contribution to the literature that emphasizes the territorializing role of accounting given that, as put by Miller (2014, p. 239), “territorialization is intrinsic to the forming of assemblages, for there is no assemblage without territory.” This section’s discussion of the implications of our observations about territorialization intensities builds on and enriches previous accounting research, shedding light on the processes through which different aspects of an assemblage mutually adjust to one other, as well as highlighting the role of what is being assembled (e.g., different flows) and the sequence of assembling. In the section that follows, we extend our discussion of the relational properties of territorialization dynamics, focusing on the implications for our understanding of actors and agency in assemblage formation processes.

Territorialization intensities and agency

Through the knob-turning metaphor inspired by DeLanda, our theoretical frame provides an opportunity to discuss the role of human actors and their agency in processes of assemblage formation. This is important because, as recently argued by Free et al. (2020), these themes remain relatively unexplored in accounting studies on territorialization. Indeed, one of the central arguments in their historical study of auditing in government is that territorialization is “put into play by strategically minded and well positioned individuals within the state apparatus” (p. 490).

In our analysis, by suggesting that regulators have their fingers on different knobs, we have approached the analysis of the cannabis market assemblage mainly from the point of view of regulators and the actions that they have available. We also stress how regulators must allow the market to work while ensuring proper oversight, as mandated by the legislative requirement not to impose any demands that are “unreasonably impracticable” for market participants. This means that behind the knobs there are not only people (e.g., regulators) facing other people (e.g., industry participants), but also interests that are being settled. Therefore, through DeLanda’s knob metaphor, we introduce the agency of human actors more explicitly than is usually done in accounting studies of territorialization. Put simply, we recognize how people attempt to do things as they seek to create and maintain a legal cannabis market, which has the effect of modulating territorialization intensities.

Bearing in mind this conceptual orientation, our empirical analysis offers insights that help to qualify how regulators' knob-turning fingers produce effects in the cannabis market. The agency associated with attempts to turn knobs remains widely distributed across different market actors. Throughout our analysis there were various occasions when we encountered how novel and surprising effects resulted from regulators' knob adjustments. For instance, by turning up the functionality-ascribing knob through the licensing regime, the regulators encountered not less but more flows of people, leading to concerns about diversion. Besides this specific example, the imagery of flows reminds us that the effect of interventions is erratic, much like the effects of changing the bank of a river or of adding a boulder to a creek.

Moreover, our analysis provides insights into the relationship between the intentions of the regulators, their actions of turning a knob up or down, and the resulting territorialization intensities. We find that the intention of regulators when they turn knobs is not pre-existing but emergent from the assemblage of which they are part and product. Firstly, regulators admitted to trying things out as they learned about the market (and cannabis) and METRC. Regulators' actions are guided by relatively simple and general principles such as keeping cannabis out of neighboring states and the hands of criminals and minors. However, when metaphorically turning the knobs, their intention is not fully known even to the regulators and cannot be separated from how the action of turning the knob unfolds and produces effects in the cannabis market assemblage. Indeed, as discussed in the previous section, the action of turning a knob cannot be separated from adjustments in the other knob.

Secondly, our analysis emphasizes how the aims behind knob-turning are not the sole domain of state regulators, but a property of the relation between regulators and regulated entities. For example, in relation to digital flows, regulated entities, and not the regulators, wanted METRC's boundary between regular and irregular data to be more clearly defined to be alerted to when they breach regulations. Our analysis of the dynamics of aspirational flows likewise shows how by responding to industry ambitions for business-friendly functionalities, METRC emerged as a more comprehensive, regulatory device; one that extends deeper into the firms' operational systems. These two examples show that, while state regulators have their fingers on the knobs, a seemingly "skillful orchestration" (Free et al., 2020, p. 487) of regulatory interventions cannot be separated from the assemblage that they are a part of, including, among other things, the technology of regulatory devices,

the patients and industry actors and their activism, federal regulations and the different types of flows.

To summarize, using DeLanda's (2016) reading of Deleuze and Guattari helps to explore how human actors and their intentions have some bearing on how assemblages are formed. Compared to previous work on the territorializing role of accounting and assemblage formation, our conceptual apparatus helps to balance attention to human, skillful actors, and the relational, at times surprising, effects of assemblage formation dynamics. In so doing, we further reinforce the importance of examining the modulation of territorialization intensity as something that human agents contribute towards, but that nonetheless remains open, multiple, and relational. In the section that follows, we move from human actors to devices and illustrate how our analysis of territorialization intensities can also be of interest to scholars who explore the role of accounting and other devices in the making of markets.

Territorialization intensities and the making of markets

Our analysis provides insights into the ongoing discussions regarding the contributions of accounting and other devices toward markets and their construction (e.g., Cochoy, 2009; MacKenzie, 2009; Miller & O'Leary, 2007; Millo & MacKenzie, 2009; Pollock & D'Adderio, 2012; Poon, 2009; Preda, 2006; Williams, 2013). In understanding how accounting contributes to the organization of markets, existing literature has tended to emphasize the capacity of accounting and other market devices to frame, format, and perform economic and other theories; that is, to make actual, the version of the economy proposed, theorized, envisioned, or assumed within textbooks, manuals, and other proposals. This is central, for instance, to Millo and MacKenzie's (2009) analysis of the institutionalization of the Black-Sholes-Merton asset pricing model and the performance of financial derivatives markets.

METRC can be understood as a market device (Muniesa et al., 2007; see also Pflueger et al., 2019), which contributed in several ways to the distinctive market that emerged in Colorado: defining its boundaries, disciplining its participants, establishing terms of trade, constituting certain product qualities, and even shaping how cannabis is grown. METRC can also be seen to provide, over time, the kind of singular reality and stable set of relations

for market participants that Miller and O’Leary (2007) describe in their work on “mediating instruments.” Indeed, the processes described above contributed to industry consolidation and significant capital investments, despite the uncertainty about the market due to Federal government’s prohibition. In short, our analysis of METRC reaffirms the central proposition that markets are socio-technical accomplishments made possible and shaped by, at times seemingly mundane, market devices (Muniesa et al., 2007).

In our setting, however, we also showed that METRC contributed to the organization of the market in a way that emphasized not just the performativity associated with market devices (Muniesa et al., 2007) or the certainty associated with mediating instruments (Miller & O’Leary, 2007), but the management of flows necessary to assemble market actors, relations, and aspirations. Our analysis highlights that flows come before the imposition of visible orders and stable relations described within the literature. Put simply, there would be no markets to be structured or performed without the assembly of people, aspirations, and things to truck, barter, and exchange in the first instance. In other words, in developing a market or “seeing like a state” (Scott, 1998), we point to the challenges and effects of creating movement as much as containment. Analytically, therefore, we need to understand the processes by which elements are, in the first instance, assembled as much as the processes of organization and structure that later follow on that ground.

This is important because the dynamics underpinning the formation of this assemblage is non-random and consequential for the markets that emerge. As discussed in the previous sections, the shape and features of the cannabis market are contingent, among other things, on the way in which digital, material, and aspirational flows become part of the cannabis market assemblage through the mutual adjustment of different territorializing processes. By shedding light on these processes and the varying intensities of territorialization, we can show how certain elements are brought into the market while others are left outside; how some functions are defined while others are left open, thereby constituting the distinctive character of the market. This then becomes the basis for mediation, coordination, and performativity of ideas as well as the emergence of a conceptual space that can be populated with accounting inscriptions and devices.

We also show how the management of flows is an important part of market creation, and a deliberate aspect of the work of regulators and other actors. Here we observed how those tasked with market creation mobilized METRC to assemble participants and encourage their flow into their regulated spaces, including black market practices and actors that

existed for long “in the shadows” (Palermo et al., 2016). This is how, we suggest, the twin realities of a commercially viable and entrepreneurial as well as controlled and contained market can be sustained. Competition emerges on top of flows already assembled in ways that ascribe a set of possibilities to some and not others. For example, through the matching of digital and material flows, market actors can grow, transport, and sell “legal” cannabis. Our analysis draws attention to these assemblage formation dynamics associated with markets in the making, which can be seen as the pre-conditions for governable and calculative spaces for cannabis exchanges and for the definition of “good” market actors and activities. These definitions can then be inscribed in accounting representations such as red flags, graphs, and data analytics, which are monitored by regulators and also used by market actors for commercial and compliance purposes.

To conclude, our analysis shows how, through the management of flows, accounting and other market devices can contribute to populate calculative spaces in the first instance, with certain digital, material, and aspirational flows but not others. Even when the theory to perform is missing or ambiguous, order can be imposed, via METRC and other devices, by enabling and constraining certain types of flows into and within these spaces. This perspective complements the focus of earlier work on assemblage formation and the constitution of governable entities via the territorializing role of accounting and market devices. As illustrated in the second section of this paper, we recognized how, in previous work, territorialization is inherently intertwined with processes of assemblage formation. As a result, “the territorialization achieved enables the entity to be represented as a series of financial flows, evaluated according to a financial rationale, and acted upon from both within and beyond in order to enhance such flows” (Miller, 2014, p. 239). Combining the case of the Colorado cannabis market with a conceptual orientation inspired by the work of Deleuze, Guattari and DeLanda, our analysis shows some evidence of the reverse dynamic, whereby creating and maintaining an entity’s boundaries need not to be seen as analytically prior to the flows being bound.

Conclusion and further directions for research

The wave of legalization initiatives that has swept North America and the globe signal a change in how cannabis is brought out of the shadows and into the state’s field of visibility. It also shows how inventory tracking and accounting systems are well placed in the

construction and regulation of these emerging markets. Building on Deleuze and Guattari and contemporaries, we suggest that something like METRC contributes to the territorialization of the market, at varying intensities. In so doing, we argue that our study has implications for our understanding of assemblage formation, and specifically the ways in which an assemblage's components, including human actors, interact one with the other, as well as knowledge about the role of accounting and other devices in the making of new markets.

While our analysis has focused primarily on academic contributions, it is possible to point to at least two implications that may have policy and regulatory relevance. Firstly, our setting helps to examine a key tension that regulators often face: how to balance public safety concerns with providing the right conditions for entrepreneurship and innovation to occur. We suggest that, by being sensitive to the variable intensity of territorialization, we can better understand how regulators in Colorado contain and protect in the name of safety (Popper, 2007) and guarantee the free and timely flows that make the market possible (Closs et al., 2004). This requires calibrating the knobs that can be used to manage the flows that are filtered in (boundary), their properties (functions), and their relations to one another. This is central for understanding a form of governance that embodies the ideals of full traceability; one, which is not about blocking, but letting flows in; one that is also as much about tracking the origins and movement of objects as constituting their properties (Power, 2019).

Secondly, our study sheds light on the politics of market creation, and how marginalization and exclusion may take place, even if they happen in ways that are not immediately recognizable. Increased levels of territorialization intensity are likely to be experienced differently by the content of the assemblage. Some industry actors can withstand increased intensity, while others may not. For some, increased territorialization may be prohibitive and for others less so. This has significant effects on the types of actors that form part of the emerging cannabis market. By this we do not just mean the enterprises that have capital and the know-how to comply with intensive territorialization, but also the types of people. People of color, for example, have to a large extent not benefited from legalization, even though people of color have been disproportionately arrested and incarcerated throughout the years of prohibition (Henry-Nickie & Hudak, 2020). The inclusion of whether a person has a prior conviction as a precondition for participation in the legal market served as a boundary that barred the same disproportionately arrested people from joining the market.

We also suggest that our study of territorialization intensities may inspire future research. Ours is a focused and partial reading of Deleuze and Guattari's territorialization concept. Further research may take on a fuller range of their concepts to uncover their more radical potential to examine, for instance, the variety of flows, the materiality of desire, the link between territorialization and other processes of assemblage formations and stratification, etc. (see Neu et al., 2009). In addition, our study may be useful for management accounting scholars interested in the study of inscription-based assemblages and their instabilities (Dambrin & Robson, 2011) by studying the flows that intersect and alter them (Martinez & Cooper, 2019). It may also be useful for those interested in understanding how the designers of management control systems may strike a balance between over-organizing (Neu et al., 2009) and giving users the freedom to threaten/improve the integrity of a management accounting system's functions. Finally, while our study focuses on two types of territorialization intensities, there may be other intensities such as the intensity of resistance to territorialization that could be further explored (see Crvelin & Becker, 2020).

Our study may also inspire the exploration of several phenomena of contemporary interest, which can be related to the emergence of tracking as a novel mode of governance (Power, 2019). For example, one area of study may be related to the way in which tracking systems are implicated in the surveillance of ethnic and racial minorities (Buckley & Mozur, 2019). Another area of contemporary interest is the way in which tracking systems, as well as flow-enabling or constraining mechanisms such as the shutdown of economies and societies, are implicated in the response to the pandemic crisis that the world is facing at the time of writing (Wise, 2020). These examples suggest how the analysis of our specific case study regarding the territorialization of the cannabis market in Colorado may usefully uncover important governance and control mechanisms that can be applied to the study of a wide range of phenomena and contexts.

References

- Arnold, P., & Oakes, L. S. (1995). Hospitals in the United States: A study of the entity assumption in accounting. *Critical Perspectives on Accounting*, 6, 105–123.
- Brohl, B. (2015). *House Bill 14-1366. Marijuana edibles work group report*.
http://www.leg.state.co.us/clics/clics2015a/csl.nsf/fsbillcont3/CE570342F005495687257E27007E922D?Open&file=HB1367_r3.pdf
- Brown, B. (2019). *Evaluation of the Colorado Department of Revenue's use of marijuana inventory tracking data*.
https://leg.colorado.gov/sites/default/files/documents/audits/1925p_evaluation_of_dors_use_of_marijuana_inventory_tracking_data_august_2019.pdf
- Buckley, C., & Mozur, P. (2019). How China uses high-tech surveillance to subdue minorities. *The New York Times*.
<https://www.nytimes.com/2019/05/22/world/asia/china-surveillance-xinjiang.html>
- Carmona, S., Ezzamel, M., & Gutiérrez, F. (2002). The relationship between accounting and spatial practices in the factory. *Accounting, Organizations and Society*, 27(3), 239–274.
- Chapman, C. S. (2005). Not because they are new: Developing the contribution of enterprise resource planning systems to management control research. *Accounting, Organizations and Society*, 30(7–8), 685–689.
- Chua, W. F. (1995). Experts, networks and inscriptions in the fabrication of accounting images: A story of the representation of three public hospitals. *Accounting Organization and Society*, 20(2/3), 111–145.
- Closs, D. J., Chain, S., & Mcgarrell, E. F. (2004). *Enhancing security throughout the supply chain* (Issue April).
https://www.academia.edu/download/35481799/supply_chain_security_white_paper_and_assessment_guide_april_2004.pdf
- Cochoy, F. (2009). Driving a shopping cart from S'TS to business, and the other way round: On the introduction of shopping carts in American grocery stores (1936—1959). *Organization*, 16(1), 31–55.
- Cole, J. M. (2013). *Memorandum for all United States attorneys: Guidance regarding marijuana enforcement* (pp. 1–4).
- Colorado Department of Revenue. (2013). *Permanent rules related to the Colorado retail marijuana code* (pp. 1–136).
- Crvelin, D., & Becker, A. (2020). 'The spirits that we summoned': A study on how the 'governed' make accounting their own in the context of market-making programs in Nepal. *Accounting, Organizations and Society*, 81, 1–17.
- Dambrin, C., & Robson, K. (2011). Tracing performance in the pharmaceutical industry: Ambivalence, opacity and the performativity of flawed measures. *Accounting, Organizations and Society*, 36(7), 428–455.
- Dechow, N., & Mouritsen, J. (2005). Enterprise resource planning systems, management control and the quest for integration. *Accounting, Organizations and Society*, 30(7–8), 691–733.
- DeLanda, M. (2016). *Assemblage theory*. Edinburgh University Press.
- Deleuze, G., & Guattari, F. (1977). *Anti-Oedipus: Capitalism and schizophrenia*. Viking Penguin.
- Deleuze, G., & Guattari, F. (1987). *A thousand plateaus: Capitalism and schizophrenia*. University of Minnesota Press.
- Finlaw, J., & Brohl, B. (2013). *Task force report on the implementation of Amendment 64*.
[https://www.colorado.gov/pacific/sites/default/files/A64TaskForceFinalReport%](https://www.colorado.gov/pacific/sites/default/files/A64TaskForceFinalReport%0)

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- Free, C., Radcliffe, V. S., Spence, C., & Stein, M. J. (2020). Auditing and the development of the modern state. *Contemporary Accounting Research*, 37(1), 485–513.
- Graham, C. (2010). Accounting and the construction of the retired person. *Accounting, Organizations and Society*, 35(1), 23–46.
- Henry-Nickie, M., & Hudak, J. (2020). *It is time for a Cannabis Opportunity Agenda*. <https://www.brookings.edu/policy2020/bigideas/it-is-time-for-a-cannabis-opportunity-agenda/>
- Hopwood, A. G. (1992). Accounting calculation and the shifting sphere of the economic. *European Accounting Review*, 1(1), 125–143.
- Hudak, J. (2014). *Colorado's rollout of legal marijuana is succeeding*. <https://www.brookings.edu/wp-content/uploads/2016/06/CEPMMJCOv2.pdf>
- Kelty, K. (2010). Colorado's medical marijuana law. *Colorado Legislative Council Staff*, 10–09, 1–2.
- Kurunmaki, L. (1999). Making an accounting entity: The case of the hospital in Finnish health care reforms. *European Accounting Review*, 8(2), 219–237.
- Latour, B. (2005). *Reassembling the social: An introduction to Actor-Network-Theory*. Oxford University Press.
- Llewellyn, S. (1998). Boundary work: Costing and caring in the social services. *Accounting Organization and Society*, 23(1), 23–47.
- MacKenzie, D. (2009). Making things the same: Gases, emission rights and the politics of carbon markets. *Accounting, Organizations and Society*, 34(3–4), 440–455.
- Martinez, D. E., & Cooper, D. J. (2017). Assembling international development: Accountability and the disarticulation of a social movement. *Accounting, Organizations and Society*, 63, 6–20.
- Martinez, D. E., & Cooper, D. J. (2019). Assembling performance measurement through engagement. *Accounting, Organizations and Society*, 78, 1–22.
- Mennicken, A., & Miller, P. (2012). Accounting, territorialization and power. *Foucault Studies*, 13, 4–24.
- Miller, P. (2014). Accounting for the calculating self. In N. Thrift, A. Tickell, S. Woolgar, & W. H. Rupp (Eds.), *Globalisation in practice* (pp. 236–241). Oxford.
- Miller, P., & O'Leary, T. (1994). The factory as laboratory. *Science in Context*, 7(3), 469–496.
- Miller, P., & O'Leary, T. (2007). Mediating instruments and making markets: Capital budgeting, science and the economy. *Accounting, Organizations and Society*, 32(7–8), 701–734.
- Miller, P., & Power, M. (2013). Accounting, organizing, and economizing: Connecting accounting research and organization theory. *The Academy of Management Annals*, 7(1), 557–605.
- Millo, Y., & MacKenzie, D. (2009). The usefulness of inaccurate models: Towards an understanding of the emergence of financial risk management. *Accounting, Organizations and Society*, 34(5), 638–653.
- Muniesa, F., Millo, Y., & Callon, M. (2007). An introduction to market devices. *Sociological Review*, 55(2), 1–12.
- Munro, I., & Thanem, T. (2018). Deleuze and the deterritorialization of strategy. *Critical Perspectives on Accounting*, 53, 69–78.
- Neil, S. P. (2014). Marijuana and tech: Colorado is now ground zero. *Huffpost*. https://www.huffpost.com/entry/marijuana-and-tech-colora_b_5715319
- Neu, D., Everett, J., & Rahaman, A. S. (2009). Accounting assemblages, desire, and the body without organs: A case study of international development lending in Latin America. *Accounting, Auditing and Accountability Journal*, 22(3), 319–350.

- Neu, D., Ocampo Gomez, E., Graham, C., & Heincke, M. (2006). “Informing” technologies and the World Bank. *Accounting, Organizations and Society*, 31(7), 635–662.
- Newman, M., & Westrup, C. (2005). Making ERPs work: Accountants and the introduction of ERP systems. *European Journal of Information Systems*, 14(3), 258–272.
- Nicolini, D. (2009). Zooming in and out: Studying practices by switching theoretical lenses and trailing connections. *Organization Studies*, 30(12), 1391–1418.
- Office of the State Auditor. (2013). *Medical marijuana regulatory system: Part 1 performance audit*.
https://leg.colorado.gov/sites/default/files/documents/audits/2194a_medicalmarijuanaregsys_031813.pdf
- Orens, A., Light, M., Lewandowski, B., Rowberry, J., & Saloga, C. (2018). *Market size and demand for marijuana in Colorado: 2017 market update*.
[https://www.colorado.gov/pacific/sites/default/files/MED Demand and Market Study 082018.pdf](https://www.colorado.gov/pacific/sites/default/files/MED%20Demand%20and%20Market%20Study%20082018.pdf)
- Palermo, T., Martinez, D., & Pflueger, D. (2016). Out of the shadows. *Risk & regulation, Summer*, 12–13.
- Pflueger, D., Palermo, T., & Martinez, D. (2019). Thinking infrastructure and the organization of markets: The creation of a legal market for cannabis in Colorado. *Research in the Sociology of Organizations*, 62, 233–253.
- Pollock, N., & D’Adderio, L. (2012). Give me a two-by-two matrix and I will create the market: Rankings, graphic visualisations and sociomateriality. *Accounting, Organizations and Society*, 37(8), 565–586.
- Pollock, N., & Williams, R. (2008). *Software and organisations: The biography of the enterprise-wide system or how SAP conquered the world*. Routledge.
- Poon, M. (2009). From new deal institutions to capital markets: Commercial consumer risk scores and the making of subprime mortgage finance. *Accounting, Organizations and Society*, 34(5), 654–674.
- Popper, D. E. (2007). Traceability: Tracking and privacy in the food system. *The Geographical Review*, 97(3), 365–388.
- Power, M. (2019). Infrastructures of traceability. *Research in the Sociology of Organizations*, 62, 115–130.
- Preda, A. (2006). Socio-technical agency in financial markets: The case of the stock ticker. *Social Studies of Science*, 36(5), 753–782.
- Quattrone, P., & Hopper, T. (2001). What does organizational change mean? Speculations on a taken for granted category. *Management Accounting Research*, 12, 403–435.
- Quattrone, P., & Hopper, T. (2005). A “time–space odyssey”: Management control systems in two multinational organisations. *Accounting, Organizations and Society*, 30(7–8), 735–764.
- Raffnsøe, S., Mennicken, A., & Miller, P. (2019). The Foucault effect in organization studies. *Organization Studies*, 40(2), 155–182.
- Rahaman, A., Neu, D., & Everett, J. (2010). Accounting for social-purpose alliances: Confronting the HIV/AIDS pandemic in Africa. *Contemporary Accounting Research*, 27(4), 1093–1129.
- Ronzani, M., & Gatzweiler, M. K. (2022). The lure of the visual: Multimodality, simplification, and performance measurement visualizations in a megaproject. *Accounting, Organizations and Society*, In press.
- Scapens, R. W., & Jazayeri, M. (2003). ERP systems and management accounting change: Opportunities or impacts? A research note. *European Accounting Review*, 12(1), 201–233.

- Scott, J. C. (1998). *Seeing like a state: How certain schemes to improve the human condition have failed*. Yale University Press.
- Smith, D. W. (2011). Flow, code and stock: A note on Deleuze's political philosophy. *Deleuze Studies*, 5, 36–55.
- State of Colorado. (2010). *House Bill 10-1284: Concerning regulation of medical marijuana, and making an appropriation therefor* (pp. 1–60).
<https://cdpsdocs.state.co.us/ccjj/Resources/Leg/2010/HB10-1284.pdf>
- State of Colorado. (2012). *Amendment 64. Use and regulation of marijuana* (pp. 1–12).
[http://www.leg.state.co.us/LCS/InitiativeReferendum/1112initrefr.nsf/c63bddd6b9678de787257799006bd391/cfa3bae60c8b4949872579c7006fa7ee/\\$FILE/Amendment 64 - Use & Regulation of Marijuana.pdf](http://www.leg.state.co.us/LCS/InitiativeReferendum/1112initrefr.nsf/c63bddd6b9678de787257799006bd391/cfa3bae60c8b4949872579c7006fa7ee/$FILE/Amendment%2064%20-%20Use%20&%20Regulation%20of%20Marijuana.pdf)
- Vollmer, H., Mennicken, A., & Preda, A. (2009). Tracking the numbers: Across accounting and finance, organizations and markets. *Accounting, Organizations and Society*, 34(5), 619–637.
- Williams, J. W. (2013). Regulatory technologies, risky subjects, and financial boundaries: Governing “fraud” in the financial markets. *Accounting, Organizations and Society*, 38(6–7), 544–558.
- Wise, J. (2020). Covid-19: Test and trace system is not fit for purpose, says Independent SAGE. *British Medical Journal*, 369(June), 1–2.

FIGURES

Figure 1. METRC Tags.



Source: Authors

Figure 2: METRC's Transportation manifest

MARIJUANA ENFORCEMENT DIVISION
MARIJUANA TRANSPORTATION MANIFEST

All sales transactions are to be completed prior to transportation of any Medical Marijuana. The receiving entity may reject product delivered, but amount delivered must be limited to amount agreed upon in prior sales transaction. If the person transporting Medical Marijuana has not yet received his or her occupational license number, put "Pending" in the appropriate field.

Manifest # : 000056760	Date Completed: 11/16/2015	For MED Use Only																																	
License # of Originating Entity:																																			
Name of Originating Entity:																																			
Address of Originating Entity:																																			
Phone # of Originating Entity:																																			
Phone # MED Can Call with Questions: 3034686100																																			
DESTINATION:		Destination Phone #:																																	
Stop Number on Route: 1	Destination License Number: -0																																		
Address of Destination:	Date and Approximate Time of Departure: 11/16/15 2:45 PM	Date and Approximate Time of Arrival: 11/16/15 4:20 PM																																	
Route to Be Traveled:		Notes: details for extenuating circumstances (e.g., road closure, flat tire, etc.)																																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 45%;">Item Description</th> <th style="width: 30%;">Package Id</th> <th style="width: 25%;">Weight/Quantity</th> </tr> </thead> <tbody> <tr> <td>Jack Flash Bulk</td> <td>400000026 1*10000 764 ✓</td> <td>448.0000</td> </tr> <tr> <td>Sour Diesel Bulk</td> <td>400000026 1*10000 513 ✓</td> <td>448.0000</td> </tr> <tr> <td>Lavender Jones Trim</td> <td>400000026001610000 313 ✓</td> <td>415.0000</td> </tr> <tr> <td>Sour Diesel Trim</td> <td>400000026001610000 647 ✓</td> <td>318.0000</td> </tr> <tr> <td>Lavender Jones Bulk</td> <td>400000026001610000 00 ✓</td> <td>448.0000</td> </tr> <tr> <td>Fruity Pebbles Trim</td> <td>400000026001610000 00 ✓</td> <td>448.0000</td> </tr> <tr> <td>Fruity Pebbles Bulk</td> <td>400000026001610000 702 ✓</td> <td>448.0000</td> </tr> <tr> <td>Jack Flash Trim</td> <td>400000026001610000 702 ✓</td> <td>448.0000</td> </tr> <tr> <td>Mothers Milk Trim</td> <td>400000026001610000 702 ✓</td> <td>448.0000</td> </tr> <tr> <td>Mother's Milk Bulk</td> <td>400000026001610000 00 ✓</td> <td>448.0000</td> </tr> </tbody> </table>			Item Description	Package Id	Weight/Quantity	Jack Flash Bulk	400000026 1*10000 764 ✓	448.0000	Sour Diesel Bulk	400000026 1*10000 513 ✓	448.0000	Lavender Jones Trim	400000026001610000 313 ✓	415.0000	Sour Diesel Trim	400000026001610000 647 ✓	318.0000	Lavender Jones Bulk	400000026001610000 00 ✓	448.0000	Fruity Pebbles Trim	400000026001610000 00 ✓	448.0000	Fruity Pebbles Bulk	400000026001610000 702 ✓	448.0000	Jack Flash Trim	400000026001610000 702 ✓	448.0000	Mothers Milk Trim	400000026001610000 702 ✓	448.0000	Mother's Milk Bulk	400000026001610000 00 ✓	448.0000
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PRODUCT REJECTION (if only a portion of shipment is rejected, circle that portion above)																																			
Name of Person Receiving or Rejecting Product:																																			
I confirm that the contents of this shipment match weight records entered above, and I agree to take custody of those portions of this shipment not circled above. Those portions circled were returned to the individual delivering this shipment.																																			
Signature:		Date: 11/16/2015																																	
Signature of individual taking receipt of rejected portion of this shipment:																																			
Name of Person Transporting:		Occupational License # of Person Transporting:																																	
Signature of Person Transporting:																																			
Make, Model, License Plate #:																																			

Form 1020 Page 1 of 2 MED Form rev 11/2015

Source: Fieldwork material

APPENDIX

Appendix 1: Interviews

Interviewees	Number of interviews	Facilities tour	Length (minutes)
Entrepreneur - Investor	1		40
Entrepreneur - Investor	1		49
Entrepreneur - Tech	1		58
Entrepreneur - Tech	1		52
Entrepreneur - Tech	1		37
Entrepreneur - Tech	1		65
Entrepreneur - Regulation expert	1		37
Consultant - Cannabis market / METRC expert	1		84
Consultant - Market / METRC expert	1		58
Consultant - Market expert	1		85
Consultant - Standard setting	1		63
Consultant - Accountant	1		28
Consultant - Insurance	1		42
Consultant - Licensing	2		60; 83
Consultant - Grower / compliance expert	2		125; 97
Inventory tracking firm - Software expert	1		84
Inventory tracking firm - Software expert	1		65
METRC expert / consultant software webinar **	1		90
MED Regulators A & B	1		81
MED Regulator C	1		39
MED Regulators A, B, & C	1		68
MED Regulator	1		53
MED regulator A - retired, now consultant	1		76
MED regulator B - retired, now consultant	1		66
MED regulators - 2 staff	1		56
State cannabis regulator (in office; retired, now consultant)	2		54; 48
Public health officials - 4 staff	2		86; 79
State prosecutor's office - 5 staff	2		81; 72
Edibles Manufacturer - CEO & marketing dir. *	2	1	83; 58
Grow facility A - compliance officer at grow * ***	3	2	170; 64
Grow facility B - compliance officer at grow *	1	1	58
Edibles Manufacturer - CEO, COO, & marketing dir. *	2	1	118; 57
Edibles Manufacturer, grow and research facility - CEO *	1	1	100
Black market grower (not recorded)	1		55
Law firm - Compliance lawyer	1		37
Law firm - 2 staff: Litigation lawyer and market expert	1		81
Law firm - Market expert	1		54
Scientist - Clinical Pharmacy	1		40

Scientist - Toxicology	1	57
Trainers - Compliance - 2 staff	1	78
Trainers - Cannabis quality - 2 staff	1	91
Trainer - Grow and compliance	1	26
Trainer - Responsible vendor	1	60
Trainer - Responsible vendor	1	80
Journalist / consultant	2	75; 83
Legalization opposition lobby	1	96
Totals	56	6

* Interviews were during or were followed by a tour of the facility

** METRC webinar attended by researchers

*** Compliance officer became METRC expert/consultant after first interview