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Hot grapes: How to locally redesign geographical indications to address the impact of climate change

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ABSTRACT

Geographical indications (GIs) represent the main legal framework for protecting the tie between site-specific food products and their places of production. Climate change recently emerged as a major challenge to the framework, uncovering its inaptitude to account for shifting product identities. Scholarly studies have so far debated the main ecological, cultural, and economic issues that climate change poses to GIs. But, they overlooked systemic conceptual problems affecting their legal framework. This paper uses philosophical tools typical of analytic metaphysics to provide an original conceptual framework for rethinking GIs. We begin with a recognition of the conceptual challenges that climate change poses to the legal framework for GIs. Next, we present our framework for GIs, articulating its internal dimensions while offering some examples. Finally, we appraise the functions that the framework can play in rethinking GIs: provide a broad and flexible theoretical structure, while also contributing to design new participatory strategies for deliberating about their identities, which involve a usually silenced class of stakeholders. Our work contributes to broadening the scopes and methods of philosophy as well as to complementing disciplines traditionally dealing with climate change, by supplying missing conceptual tools. The framework we lay out can be used as a proxy for rethinking GIs through new decision-making processes that carve out a role also for local actors and communities along with the usual stakeholders.

1. Food and place: the central role of GIs

In recent years, philosophers have joined several other scientific communities in the study of climate change [17,29,72,76] and, on some occasions, geographical indications (henceforth, GIs; [8] and [9]). Still missing is a philosophical analysis—both conceptual and value laden—of the challenges that climate change poses to the future of GIs, which lately surfaced within scholarly circles as well as among stakeholders. In fact, the severing of the tie between GIs and their areas of production due to climate change have been widely addressed with different methods, which focused on the effects on the products [16], on adaptation [56] and mitigation systems [34] as well as on broader cultural [36], environmental [57], and economic effects [2,54]. This paper offers a perspective and method: by employing philosophical tools typical of analytic metaphysics , we put forward a toy model for redesigning GIs that both addresses the challenges of climate change while enabling the development of participatory strategies at a local scale.

Food products (including beverages) and places are often linked. For example, some foods are meant to be consumed in specific places, like an espresso made to be served at a cafè counter [61], a taco sold to be consumed on a street [50], or an *ekiben* designed for a Japanese train [63]. A very special function, though, is reserved to site-specific foods, that is, those that are meant to be produced in specific geographical regions. This is one of the most significant food categories to be entangled with space, which cuts across gastronomic traditions.

Site-specific foods have been documented in numerous ancient societies, including those of ancient China, Egypt, and Greece [59]. They encompass a wide spectrum of products, such as tea, coffee, oil, wine, cheese, meat products, and fruits. The legal framework for GIs is the most well-known tool for protecting the identity of site-specific food products. As Meloni & Swinnen [55] argue, its most direct ancestor was the Appellations of Origin (*Appellations d'Origine*) system attributed to Champagne in 1908.[1] This system improved on earlier regulations regarding Burgundy wines (dating from the 15th century) as well as Port, Tokaj-Hegyalja, and Chianti wines (18th century), and it was by and large intended to settle the trade issues between old and new producers, preserving the political and commercial powers of historical stakeholders [55].

Comprehensive legal frames for GIs were proposed at national and international levels since WWII, most importantly with the TRIPs agree-

[1] For a legal and economic history of GIs as well as an analysis of their financial import for local communities and international companies, see Giovannelli et al. (2009), and Yeung (2014).

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ments of 1995, which further strengthened the role of GIs in food trade, marketing, and communication.[2] Within this context, GIs have been hailed as positive legal tools whose goal is to safeguard the right of consumers to be informed about the provenance of their food and, also, to assure producers of the protection of the trade value of their goods, including cultural values too [42].[3]

However, numerous and serious concerns have been more recently raised towards the capacity of GIs to fulfill their positive functions. Some have argued that GIs tend to protect—on a global scale—the economic interests of the most powerful actors to the disadvantage of small-scale traditional producers [15,32], deepening structural inequalities affecting food systems and favoring actors who benefit from institutional support (see the essays collected by [7]). Others have criticized the imbalance in global distribution of GIs between the North and the South [6]. Additionally, Sherman & Wiseman [71] argued that the current framework for GIs is inadequate to represent the historical and cultural significance of food products emerging from non-Western forms of traditional ecological knowledge, namely a form of competence held by laypeople in virtue of their experience. Finally, particularly poignant are those concerns targeting the sustainability of GIs *vis-à-vis* climate change and those demanding more democratic, inclusive, and resilient food systems [4,65].

In this paper, we specifically address topical criticisms, which relate to climate change and contend that, in their current form, the legal framework of GIs is conceptually ill-suited to face the social and ecological shifts ensuing from future climate patterns (e.g., [9,27]). To keep the discussion focused, we primarily consider wine production, as one of the most renowned and symbolic—as well as possibly most affected—industries in the context of GIs and climate change [40,82].

Some solutions have been set forth to offset the effects of climate change on GIs [20,39,58]. These attempts, however, fail to appraise the systematic conceptual challenges that climate change is posing to the legal framework of GIs, which call for theoretical work—and, hence, also the philosophical kind of work that we outline. The next section will be devoted to spell out those challenges (§2). Next, we offer guidance on how to redesign the GIs legal framework in light of climate change, dividing the task into two steps. First (§3), we present a conceptual framework for rethinking GIs that is meant to ground the legal one; second (§4), we propose a deliberative strategy onto which our conceptual framework can be grafted, resting on the belief that the task of rethinking GIs must be brought forward in a concerted effort involving not just multiple disciplinary perspectives but also different stakeholders and actors.

2. GIs and climate change: four emerging conceptual challenges

Major concerns regarding GIs and climate change have been built around the multifarious and harmful effects that new environmental conditions can have on food products. Yet, the projected impact of climate change on GIs has brought to light additional fundamental flaws, which are conceptual in nature as some authors have independently pointed out (e.g., [8,20]). This is because GIs are, in ultimate istance, representational devices purporting to characterize a specific food product via its link to a geographical area; *qua* representations, GIs communicate specific perspectives over a certain product. Thus, for instance, the GI "Champagne" is meant to capture a host of aspects—including, but not limited to the gustatory, microbiological, and biochemical aspects as well as some key social, environmental, and political relations—all of which must be protected in order to preserve the food products we label as Champagne. Yet, the choice of the specific set of aspects that ends up characterizing a GI is not merely technical (and, in this sense, it is cannot be regarded as "neutral"); rather, it reflects the adoption of culturally variable representational criteria (e.g., what counts as a food product, what is the link between food and place) as well as specific epistemic and political goals (e.g., by privileging microbiological composition over historical continuity, or by preserving the role of insiders as key decision makers regarding labeling rules and regulations).

Drawing from different strains of the literature, in this section we originally systematize the main conceptual challenges posed by climate change to the current legal framework of GIs into four categories. To introduce them we draw examples from the wine sector, though parallel cases can be envisaged concerning other kinds of food products. As it turns out, these conceptual challenges stem from an incoherence between the purported aspects of the food product, on the one hand, and the changes that the food product as well as the consumption practices undergo over time,[4] on the other hand. The incoherence is exacerbated by the fact that the authorities demanded to govern GIs do not have a process in place to fix the flaws.

2.1. The challenge of relocation

The challenge arises when climate change threatens production in the geographical area currently linked to a GI and, at the same time, some other (possibly distant) geographical area *prima facie* meets or exceeds the standards of production for the GI.[5] A notable example involves Champagne, for which both a full and a partial relocation have been considered. Studies and tests have suggested that a new suitable *terroir* to produce Champagne can be found in Kent (UK), which has acquired more lenient climate conditions ([69]: 177–189). A bunch of different scenarios have been forecasted, including: revising the boundaries of the original region to make space for Kent; splitting the GI, introducing new labels for France and Kent; maintaining in effect current legal status, preserving the GI only for Champagne; fully relocating the entire GI to Kent. These scenarios suggest that we can easily envisage new maps for the future of Champagne that include partial or full relocation of production increasingly northward [35,60]. Analogous considerations do and will apply to several other current GIs. Looking at the past, too, can easily showcase how an established wine production can cease to exist—at least in relation to a specific territory. For instance, since the fourth century Roman sources recount the renowned qualities of muscat produced between modern Turkey and Lebanon; yet, the production ceased following the starting of Arab ruling over the region (for an historical reconstruction see [79]: 149–150). All these considerations provide evidence that relocation is a major challenge for the future identities of GIs. Hence, the question stands of whether the production ought to be fully or partially relocated, in order to salvage its existence and integrity.

2.2. The challenge of procedure

The challenge arises when, due to altered climatic conditions, traditional techniques of production—such as training systems, management and oenological practice—are no longer employable. Remediatory techniques have exploited microbial activities through the use of chemical intervention [5], resorted to dealcoholization [23], or modified viticultural aspects such as the height of grapevines' trunks, or the leaf-area to fruit-weight ratio, or the timing of pruning (see [82]). Thus, the question stands: how to alter (if possible) production techniques without compromising the integrity of the GI?

[2] For a legal and economic history of GIs as well as an analysis of their financial import for local communities and international companies, see Giovannelli et al. (2009), and Yeung (2014).

[3] For a recent review on GIs in the European market, see Raimondi et al. [67]; for the role of GIs in promoting the development of local economies see Crescenzi et al. [21]. See also Caenegem & Cleary [81] for a global analysis.

[4] Due to a variety of factors not limited to climate change, but also related to mechanization, digitalization, new lifestyles, migration, and so on.

[5] For a study hinting at the dramatic shifts that await agricultural production in the near future, focused on coffee, cashews, and avocado, see Grüter et al. [33].

2.3. The challenge of overturning

GIs are considered suitable proxies to protect site-specific food products as well as the people and the social conditions linked to them. But, in light of shifts in climate patterns, should a GI change its grape varieties and its producers? For instance, the INAO (French National Institute of Origin and Quality) has recently granted six new grape varieties for the production of the Bordeaux wine for their high tolerance to the effects of climate change;[6] in other instances, producers are resorting to GMOs of the original cultivar (see [31]). Overturning may also concern social aspects of production, as new generations come to have different epistemologies (e.g., shifts in educational background in winemakers for best addressing climate change)[7] or to include different social groups (e.g., through regional or international migration, including the so-called environmental migration).[8] Overturning poses a general problem to the legal framework of GIs, as it does not regulate the extent of the changes in production which are meant to protect. Thus, one can wonder which changes in the historical continuity of the product and people are admissible, and which are not admissible, in light of the prominent goals of GIs.

2.4. The meta-challenge of legitimacy

Who should be in charge of managing the three challenges? Which decision-making models should guide amendments of GIs? This is, in fact, a meta-challenge, as it cuts across the three previous ones. Primarily, it addresses the rights of those actors that are usually left out of decisional processes regarding GIs. The list includes not only small-scale producers, but also employed farmers and workers, communities whose identity is involved with the GI, and other actors who may claim some expertise with respect to the GI. How to define food expertise is a complex issue insofar as it is a multifarious domain of different skills (from food chemistry to traditional ecological knowledge) and agents (including scientists, local authorities, cooks, critics, gourmands, and everyday diners). Questioning food expertise highlights important issues regarding its unjust accreditation across different genders, ethnicities, and social classes (see, inter alia, [41]). Despite the importance of these matters, the meta-challenge of legitimacy is less discussed in recent literature on GIs and climate change; we shall regard it as pivotal to ensure processes of change that are democratic and inclusive, reflecting the beliefs of multiple actors over tradition, authenticity, and identity of a product, as we further elaborate below.[9]

3. A conceptual framework for rethinking GIs

The condensed picture we offered shows that the current legal framework of GIs faces daunting challenges vis-à-vis climate change. Failing to meet such challenges in the near future would undermine the ideal role of GIs as effective tools to guide producers, consortia, and consumers in assessing the identity of wines and other site-specific foods and beverages. Multiple suggestions were advanced in recent years. Yet, a comprehensive diagnosis of the principal conceptual issues, meant to provide systematic strategies to amend the framework, is still missing to date.

Given the conceptual nature of the issues at stake, we suggest that recent philosophical work on food ontology and, in particular, on food concepts can prove useful to address these challenges. Philosophers of food with a theoretical perspective have recently designed solutions for rethinking food identities in other domains. For instance, philosophical frameworks have been fully or partially developed for items such as recipes ([10] and [11]), wild foods [12], local food [14], food and cultural identity [38], and historical foods [44]. In addition, such conceptual work finds a correlation in formal representations of food ontologies, a prominent example being FoodOn (see [24]).

A conceptual framework fit to address these challenges is offered by Borghini et al. [13], who study defective food concepts, that is, concepts that fail to accomplish their tasks either because they cannot properly represent a specific domain (e.g., when 'healthy food' is *de facto* conducive to unhealthy diets), or because they do not deliver the expected socio-political outcomes (e.g., when 'local food' fails to support small farmers and communities). The framework analyzes food concepts along four dimensions, which emerge from an analysis of different ways of understanding and speaking of food in ordinary, political, and scientific contexts (e.g., beliefs, desires, norms): the empirical observations of food (e.g., chemical, ecological, historical data); the categorizations that depend on our cultural and cognitive constraints and through which we assess and organize foods (e.g., traditional foods, breakfast, diets); the values and norms we would like to abide by and reach through food-related behaviors (e.g., appropriate ways of eating, healthy eating, the defense of a tradition); the opinions or beliefs through which agents decide what to consume (e.g., which aspects fix the identity of the product, including which processes and which ingredients must be employed during production, and who should have the authority to decide on these matters). The analysis is meant to lay out the defective aspects of a concept, singling out where and how to amend it.

DIMENSION 1: *Data and methodologies*. What are the relevant data that a food concept is meant to represent? Has data been duly collected?

DIMENSION 2: *Ontological categories*. Which ontological assumptions—i.e., regarding their categorization or their specific role in a given context—are explicitly or implicitly made by a concept?

DIMENSION 3: *Aims and values*. Which aims and values is the concept expressing, and which ones it *meant* to express?

DIMENSION 4: *Decisional Processes*. Which actors hold decisional power over the uses and meanings of the concept?

In the case of GIs, we can illustrate these four dimensions by means of the schema in Fig. 1. For instance, the data may include gustatory properties (e.g. taste, odors, soundness), chemical constituents (e.g. sugar, acids, yeasts), and culturally-determined aesthetic properties (e.g. goodness, authenticity, elegance). The ontological categories, instead, may group wine products based on alcohol content (e.g., unfortified wine, whose alcohol by volume is between 5.5% and 16%, fortified wines which range from 15.5% to 25% alcohol by volume), types of yeasts (e.g., spontaneous fermentation, starter cultures), and production methods (e.g., natural wine or biodynamic wine). The aims and values may be epistemic (e.g., to make consumers aware of health risks or environmental impact), social (e.g., to foster tradition or social inclusion), or esthetic (e.g., to facilitate sensory, emotional, and intellectual pleasures during consumption). Finally, in the case of wine, there are at least three different kinds of prominent actors: decision makers (e.g., consortia, governments, etc.); stakeholders (e.g., insiders, tourists, etc.); experts (e.g., scientists, local experts, etc.).

The schema in Fig. 1, thus, serves as a guide for all those projects which aim at solving disputes about the identity of GIs and envisioning alternative futures for them. By polling multiple actors circa their views on key aspects of the four dimensions, a researcher gains insight over different interpretations of a GI concept and, most importantly, can locate the critical areas of disagreement and consider strategies for negotiation and amendment.

[6] The official statement of the consortium can be retrieved here: <https://www.planete-bordeaux.fr/wp-content/uploads/NOUVEAUX-CEPAGES-DANS-LES-CAHIERS-DES-CHARGES.pdf> (Last visited December 3, 2022)

[7] On generational change in farming methods, see [18]. For a study of the specific Hungarian case, see Csizmady et al. [22].

[8] On the impact of migrants' knowledge on farm techniques see Klocker et al. [43]; on environmental migration see [30].

[9] For some stark examples, see the case of power relations among producers of Queso Chontaleño cheese in the Chontales Department in Nicaragua (Mancini [53]) and the case of Feni Liquor in Goa India [68].

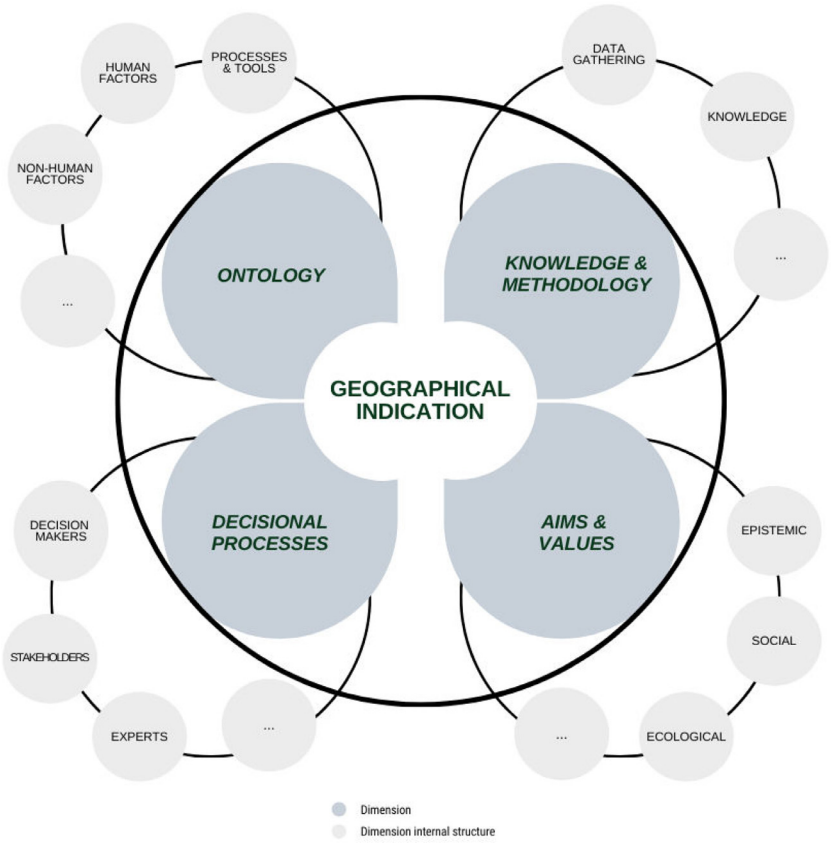

Fig. 1. Schema of the proposed four-dimensional framework of a GI designed to guide the deliberative processes aimed at rethinking the identity of the GI. The schema represents the dimensions of the GI along with an exemplification of their possible internal elements.

Table 1
Exemplification of how two opposed views on GI would assess the four challenges.

	Scientific Interpretation of GIs	*Terroir Interpretation of GIs*
Relocation	Possible: as long as the scientifically testable profile of the wine remains the same.	Impossible: since even if the physical features are the same in the new region, the social and cultural factors could not be found in the destination of the relocation.
Legitimacy in Relocation	Based on scientifically testable properties.	Based on social, cultural, and environmental conditions.
Procedure	Admissible: as long as the change in techniques does not alter the scientifically defined profile of wine.	Rarely admissible: the central role of tradition and history makes it hard to substitute traditional techniques without compromising the identity of wine.
Legitimacy in Changing Procedure	Based on the scientific testable similarities between the wine produced with old techniques and the wine produced with the revised techniques.	Based on the historical continuity between the techniques.
Overturning	Possible: if the scientifically testable properties of wine are considered the results of local ecological conditions, the same qualities and conditions could favorably impact another production as well.	Not clear: whether a new grape variety brings about a new terroir (and hence a new GI) or not, is not openly specified.
Legitimacy in Overturning	Based on scientific assessment of the ecological conditions impact on the new product.	Based on the definition of terroir in use.

We can put the schema at work to address the four challenges we have presented. For the purposes of illustrating our framework, we will offer schemas of two interpretative approaches to wine GIs, which we refer to as the *Terroir Interpretation* and the *Scientific Interpretation* (cf. also [8] and [9]) (see Table 1). These two approaches endorse opposite views on the identity of wine: while the latter contends that the identity of wine rests on its biochemical profile (and thus, on objectively measurable properties), the former emphasizes the historical and social character of wine as constitutive of its identity.

The *Terroir Interpretation* is based on the concept of terroir. Terroir stands for a complex system of ontological, epistemic, affective, and historical bonds that a community bears to a place. Such a system cannot typically be reduced to its components; also, it is a dynamic entity, "a living and innovative space" ([75]: 69) that allows groups and communities to build upon their own heritage and move it forward. The terroir of a wine binds a wine product to its place of production. It makes a wine product unique, accounting for the "theoretical inability" to reproduce such a product in a site different from the original terroir (Deloire et al., 2008). Although measuring terroir via empirically quantifiable indicators can and has been done, numerous controversial aspects remain, such as: identifying a set of indicators that are shared across different wine products; select the indicators relevant to a specific case study; providing methods for measuring them; and determining who ought to design and manage the measurement.

The concept of terroir and the concept of GI do not perfectly align (cfr. [8] and [9,20,27]). Landscapes, people, and traditions—crucial el-

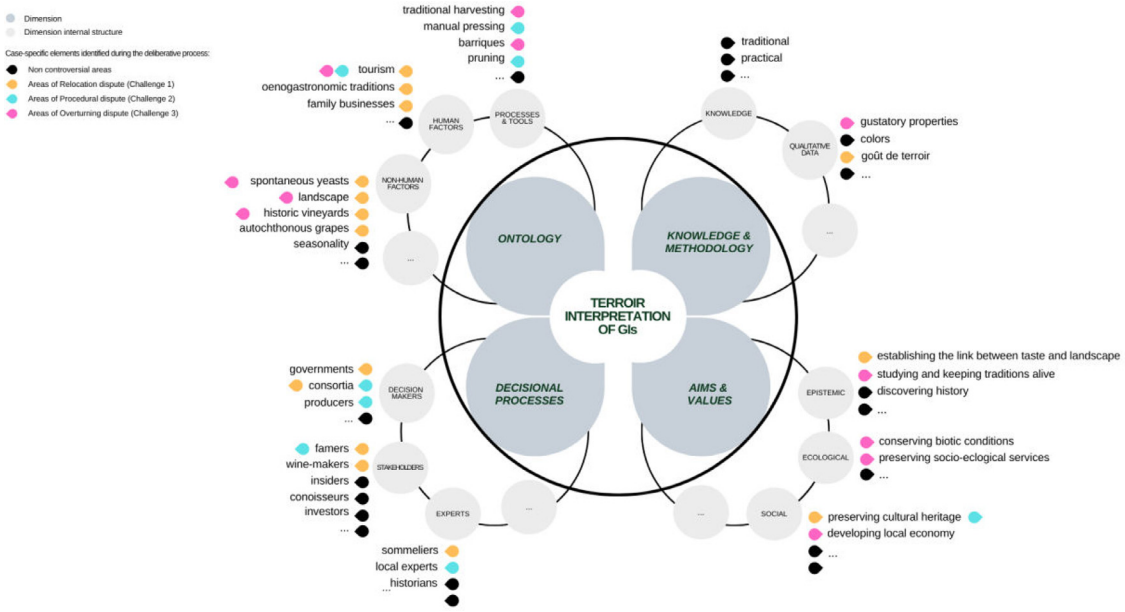

Fig. 2. Terroir-based Interpretation of GIs. The figure captures a hypothetical interpretation of a GI inspired by a terroir-based approach, which emphasizes the qualitative aspects of the GI linked to traditional techniques, localized knowledge, and single biotic properties. Under the interpretation, the identity of the GI is due to the historical, social, political, and economic links between the wine and the production place.

ements of terroir—are doomed to change over time, while GIs strictly link the identity of a wine to an allegedly unchangeable land. Such an inconsistency is the source of the failure of this interpretation. Fig. 2 represents a hypothetical GI inspired by the *Terroir Interpretation*, which emphasizes the qualitative aspects of the GI linked to traditional techniques, localized knowledges, and single biotic properties. Under this interpretation, the identity of the GI is due to the historical, social, political, and economic links between the wine and the production place.

The rapid increase of the adoption of biotechnological tools in wine production, has led more recently to a *Scientific Interpretation* of GIs. This holds that the identity of a GI wine is fixed by its scientifically testable properties and, hence, being the same wine means sharing a specified set of those properties studied by the natural sciences (e.g., [51] for an up to date review). It is common to encounter scientific interpretations of a GI wine that bolster to have pinned down its terroir in terms of measurable and testable properties. But, it is important to note that such an approach comprises a "narrow" interpretation of terroir, which stands in contraposition to the "humanist" interpretation offered above ([78]: 69).

The appeal to scientific analysis typical of the Scientific Interpretation—already debunked on various grounds (see [8] and [9,64,80])—is not sufficient to guide decisions concerning the four challenges we have laid out. The Interpretation, in fact, uncritically entrusts scientists in deliberating regarding matters of wine identity, without providing clear guidelines on what determines the identity of a wine product and which deliberative processes should lead up to a decision. In Fig. 3, the four-dimensional framework is applied to a hypothetical GI inspired by the *Scientific Interpretation*, centered on biochemical compounds, i.e., where the identity of the wine is fixed by its biochemical properties and other natural (e.g., biological, geological, or nutritional) characteristics, which can potentially be found (or artificially located) in any place regardless of its historical, cultural, and political features. Fig. 3 also reports areas of dispute that concern the four challenges posed by climate change, thereby locating the aspects of the GI that are in need of negotiation and amendment.

Between the two idealized stances of the *Terroir Interpretation* and the *Scientific Interpretation* stands a wide spectrum of mixed positions. For instance, a mixed-interpretation may be offered by an account of GIs inspired by the guiding principles of the international movement Slow Food, which highlights both the social and historical import of the food product as well as the biochemical properties that link the product to a specific region of production (see [66]).

The conceptual framework we have presented could be implemented with a multiplicity of deliberative strategies for rethinking a GI. To finish up our work, in the next section we suggest that, to address the challenges of GIs and climate change, the framework could and should be used in conjunction with deliberative democratic processes as suggested by literature on democratization of science (e.g., [1,45,47]).

4. Putting the framework at use

Let us take stock. We presented an original overview of the challenges that climate change is posing to the current legal framework for protecting GIs. We then laid down a four-dimensional conceptual framework to assess which conceptual aspects of a GI are in need of amendment and in envisaging solutions. Next, we should wonder what functions our framework can perform in the process of rethinking of GIs in light of climate change.

First of all, our framework holds epistemic values within the scholarly debate on GIs. It provides a largely *invisible theoretical structure* needed to construct resilient and inclusive models for GIs, suitable to sustain the environmental, social, political, and cultural changes that the debate on GIs highlighted. The framework, thus, is a theoretical tool that can be used to connect, clarify, and consolidate the work of other scholars when developing models of specific (clusters of) GIs—for instance, when envisioning the future of a specific wine and its territory, e.g., Champagne wine, or the future of all wine denominations in a territory, e.g., all the wines in the Bordeaux region. Secondly, by highlighting the complexity of the identity of GIs, our framework can justify and inspire the design of new participatory strategies for GIs, which call for the involvement of a wider spectrum of actors to effectively reflect the link between a product and a place. As current literature suggests, if the goal of rethinking GIs is not only "identifying the product with sufficient precision but also identifying processes which enable egalitarian participation across the supply chain and informed debate around the

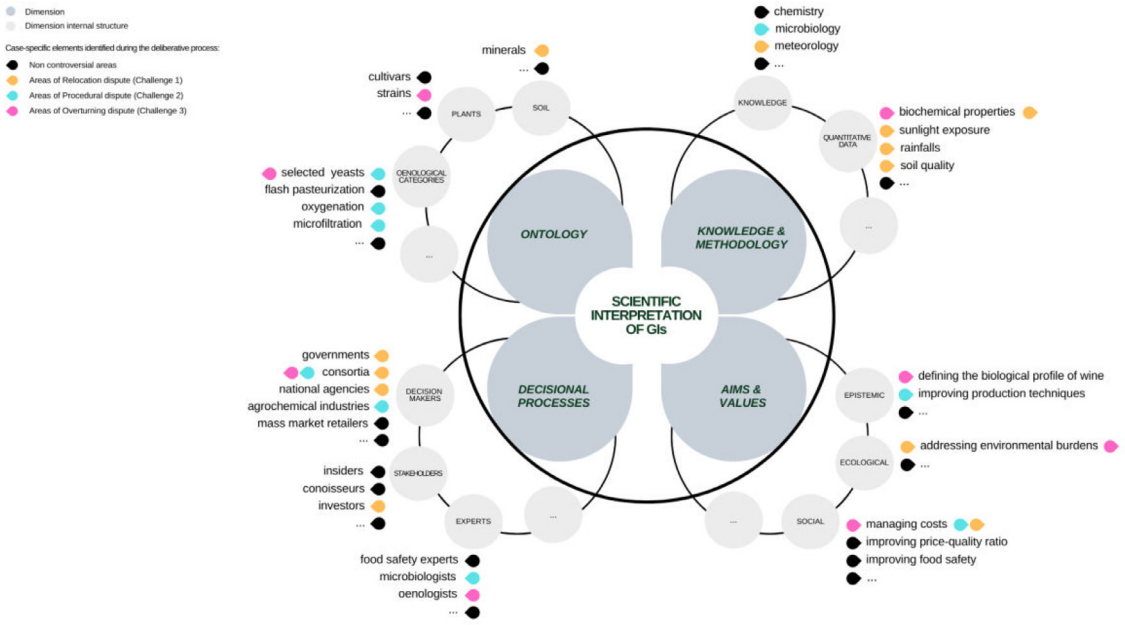

Fig. 3. Scientific Interpretation of GIs. The figure captures a hypothetical interpretation of a GI inspired by a scientific view centered on biochemical compounds, i.e., where the identity of the wine is fixed by its biochemical properties and other natural (e.g. biological, geological, nutritional, …) characteristics. The figure also reports areas of dispute that concern the four challenges posed by climate change, thereby locating the aspects of the GI that are in need of negotiation and amendment.

product" ([28]: 21; on this point, see also [4]), then we have to intentionally design novel deliberative strategies regarding the identity of GIs that can: (1) create collaboration among different actors; (2) increase the participants' set of information on the matter, thus allowing them to become more knowledgeable; (3) allow to share ideas among different actors, with different backgrounds and interests; (4) guide participants in identifying efficient solutions to the problem at hand; (5) orient the parties towards a shared and common decision, that everyone can consider good.

Our framework can therefore supply a theoretical backing for implementing democratic deliberative strategies in the legal framework of GIs. This endeavor should contain not only some guiding principles of democratization, but also directives as to how to implement them.

Democratization of science is the practice of keeping into account the perspectives of lay people in deliberative processes that concern scientific research, including the practice of assisting non-experts in expressing their opinions. In fact, people fund scientific research and, at least in liberal societies, science should pursue public practical and epistemic goals (see [46]). This approach nurtures the cooperation between scientific experts and groups of citizens possessing traditional ecological knowledge [3,52]. Combining and integrating scientific knowledge with traditional ecological knowledge (e.g., workers, consumers, migrants, and so on), represents a crucial step for establishing a shared identity.

Democratization of food—originally grounded in environmental sustainability [49]—rests on the idea that food systems should not be governed only by institutions or big companies, but also by a wide spectrum of different actors [37,77]. GIs threatened by climate change are a textbook case study that brings together these two strains of literature.

The deliberative democratic model seems appropriate to sustain the democratization of science since it offers an inclusive representation of the components, processes and agents connected to a product, as well as of their impact on its social and cultural meaning [19]. That is, directly informing and engaging citizens in deliberating between alternative choices. At the same time, Ankeny [1] recently suggested to use democratic deliberative approaches tools to guide decisions regarding food security, labeling, food safety, and new biotechnologies applied to food. As pointed out by Ankeny, at least four models of deliberative democracy (consultation by submission, citizens' conferences, citizens' juries, and local food planning) have been tested by different national and international agencies (e.g., FDA in the USA, EFSA in Europe).

A fitting model adopted in other spheres of deliberation is the one of mini-publics [48,62,70].[10] These are institutions in which a small sample of diverse citizens deliberates over an issue of public concern [25,73,74]. Gatherings of a mini-public usually last several days or weekends, and produce policy recommendations. The number of participants is small enough to ensure that genuine face-to-face deliberation can occur. Participants are typically drawn at random from a wider list, in such a way to ensure a diverse array of relevant social profiles.

Three reasons make mini-publics particularly suitable to address GIs and climate change in light of the democratization of science and food democracy: first, they are composed by local people affected by climate change in their culinary culture; second, the forums are small enough to be tutored by scientists; third, the selected people represent various kinds of TEK differently distributed in society sections.

A recent proposal endorsing mini-publics as ideal strategies for guiding decisions about contested food issues, comes from a study of Lebanese fermented foods by Feghali et al. [26]. In Lebanon, the complex balance between the achievement of food safety for traditional fermented products and the maintenance of their cultural integrity seems to be hardly obtainable by the sole imposition of top-down, institutional directives. Conversely, a bottom-up approach that directly engages local stakeholders (e.g., artisanal producers) creates procedures that are more sensitive to the social and cultural meanings of the traditional food products. To guide bottom-up processes of deliberation, Feghali et al. [26] introduce a toy model that, first, helps the stakeholders in listing all the components, processes, and agents relevant for the iden-

[10] We are much indebted to Giulia Bistagnino, Matteo Bonotti, and Nenad Stojanović for their expert consultation on this part of the paper.

Table 2
Overview of the toy model that can be used during a mini-public. Questions in the model are meant to be answered by the actors involved in the mini-publics, providing the basis for a more comprehensive deliberation process on the site-specific food at stake and relative GI.

	Tasks	Questions
Step 1	Fill out the dimensions.	Are all the elements represented in the model?
	Filling out the four-dimensional framework resting on the informed opinions of the participants in the mini-public.	Is there a hierarchical relation between the dimensions?
Step 2	Identify the challenges.	Where do the challenges fall within the schema? (Find the areas of dispute.)
	Pointing out the challenges in the schema, finding the affected dimensions, and legitimating the authors who should settle them.	Which dimensions—or parts thereof—can be altered in order to meet the challenges without compromising wine identity?
		Who can or should settle the challenges?
Step 3	Redesign the dimensions.	What are the best solutions to the challenges?
	Identifying possible solutions by redesigning the four-dimensional framework in the schema, negotiating new contents for each dimension or individuating new actors.	How should the framework be redesigned in order to address the challenges?
Step 4	Deliberate.	How should the new GI be set up matching the redesigned dimensions of the framework?
	Using the revised framework in order to fix new criteria for the GI under consideration.	How should policies be implemented respecting the dimensions of the framework?

tity of the product, and that, second, suggests to the stakeholders the right questions for assessing the importance of each of those elements.

Combining the model of Feghali et al. [26] with the conceptual framework for GIs, we foresee a similar two-step deliberative process (see Table 2). The first step is meant to lay out all those features of the GI that are key to its identity and that may need to be modified; during the second step, by means of four questions, participants of the mini-public discuss and deliberate on whether and how to change each of the key features. This approach aims to engage in the decisional process all those agents who are traditionally excluded (e.g., insiders such as employees or traditionally underrepresented categories such as women) and that may claim a cultural tie or an intimate relationship with the food product as long as such product plays a key role in fostering their collective memory, cultural heritage, and economic interests.

4. Conclusion

Extant literature on how GIs are affected by climate change has mainly focused on the direct effects of new climatic conditions on the production process. Our paper, instead, brought to light the conceptual weaknesses of the current legal framework of GIs, which fails to keep up with the changes in processes of food production and consumption, including changes to the ecological *milieu* of the product. The upshot is that the current framework is an unsuitable protection tool for the intellectual property rights of local communities. To rethink GIs, we outlined a new conceptual framework which serves as the basis for identifying, revising, and democratically negotiating all those aspects impacted by climate change.

Our framework may be generalized to solve representational and deliberative challenges that emerge with other food products—such as cheese or olive oil—or with new labeling strategies, new production techniques, or new health protocols. More straightway, the framework provides arguments and strategies to adopt more democratic processes for managing wine GIs. Drawing on current promising trends on the democratization of food and science, based on deliberative democratic models, we suggested that the conceptual amendments of GIs in the case of wine should be carried out by including in the deliberation process a wider spectrum of stakeholders than those currently involved—which are now limited to the consortia of producers. Of course, in this study, we put forward a toy model of a revised deliberative process, to be refined and articulated further. Even so, we offered a strategy for addressing in a systematic manner the daunting challenges posed by climate change to the future of GIs.

Declaration of Competing Interest

All authors declare to have no conflict of interest with respect to the present submission.

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