

What does cultural innovation stand for? Dimensions, processes, outcomes of a new innovation category

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Abstract

This article introduces the notion of cultural innovation, which requires adapting our approach to co-creation. The argument opens with a first conceptualization of cultural innovation as an additional and autonomous category of the complex processes of co-creation. The dimensions of cultural innovation are contrasted against other forms of innovation. In a second step, the article makes an unprecedented attempt in describing processes and outcomes of cultural innovation, while showing their operationalization in some empirical case studies. In the conclusion, the article considers policy implications resulting from the novel definition of cultural innovation as the outcome of complex processes that involve the reflection of knowledge flows across the social environment within communities of practices while fostering the inclusion of diversity in society. First and foremost, cultural innovation takes a critical stance against inequalities in the distribution of knowledge and builds innovation for improving the welfare of individuals and communities.

Key words: co-creation; cultural innovation; diversity; innovation; research infrastructures; social innovation

1. A notion taken for granted

What does cultural innovation stand for? There are several occurrences of the term, which has been receiving increased usage in Europe after being adopted for designating a strategy working group dedicated to the research infrastructures for Social Sciences and the Humanities, *social and cultural innovation* (ESFRI 2018).¹ Obviously, the fact that the term has been introduced by the European Commission can have many explanations. We might think, for example, of the need of mediating between various pressures and requests, while trying to hold together the world of ‘Science in Society’ and the variegated humanities world and eventually link humanities themes to innovation. However, it seems that the meaning of cultural innovation has been taken for granted so far as evident in a pragmatic framework. For instance, the term has been used around creativity (Jöstingmeier and Boeddrich 2005), marketing (Holt and Cameron 2012), and migration (Pozzo and Virgili 2017). While a number of definitions of *social innovation* are being abundantly discussed (Moulaert et al. 2017), it is a fact we have not been able to track down any definition of *cultural innovation* within innovation studies. The *cultural dimensions* of

innovation are far less defined than the social aspects accompanying innovations.

In this article, we reflect on cultural innovation in a way that is triggered by a specific policy discourse. We take it that policy-makers, researchers in Science and Technology Studies as well as economists would want to know more about a notion that finds its origin in the domain of cultural economics, innovation economics, and social innovation studies (Godin 2007, 2015; Bontems 2014). Especially, the lack of a clear conceptualization of cultural innovation is preventing the development of indicators to measure it, which are crucial to plan, monitor, and evaluate policies (Archibugi et al. 2009; Godin 2009; Ratti 2015; Bonaccorsi 2018; OECD 2019).

We believe cultural innovation should be analyzed in the context of systemic boundary conditions. For this reason, this article is about dimensions and processes that define outcomes of cultural innovation.

Our aim is not to assess well-known innovations with relation to their cultural impact. It is instead to define a new category of innovation that ought to be added to the existing categories that are usually defined and measured by specific indicators, such as

technological, organizational, service innovations together with all kinds of social innovations. We are talking of cultural innovation as a new category that results from the processes generating it, namely those related to co-creation.

2. Dimensions

What needs to be considered is the gap between the discourse about innovation as part of the economic sphere and the reflective, critical attitude of Science and Technology Studies that stresses the *social shaping* of technological innovation (Bijker et al. 2012).

Let us first see how to enucleate the *cultural dimensions* of an innovation in the public space. In fact, for long the equation *innovation equal to technology* has been the hallmark of economic theory as well as of the agenda of policymakers (Nelson and Rosenberg 1993). Looking for an economic definition, in the Schumpeterian perspective of a new combination of production factors by an entrepreneur with a perspective of profit, a question to ask is: who qualifies as the entrepreneur or the innovator? Is cultural innovation about companies, public institutions, groups of citizens?

Answering this question seems important to understand *the meaning of the economic part within cultural innovation*. The company within a system of institutions or an ecosystem of institutions, organizations, citizens, and consumers is certainly one of the main actors. Think first and foremost of Olivetti, the inventor of the first desktop computer in 1964. Private sector foundations and charitable trusts are also actors of cultural innovation, which has found its place in some of their programs, although without any definition.² Other actors are universities and government research facilities, as it has been pointed out by research on national innovation systems (Lundvall 1998; Godin 2007) and on the triple helix (Etzkowitz and Leydesdorff 2000), for example, the ESFRI since its Roadmap 2016 (ESFRI 2018).

Let us look back at history. The *linear model of innovation* emphasized the role of science as source for further technological developments and thus innovation for the market (Bush 1945). As such, innovation was conceived as new products and new processes that encompass some novel technological step. In this model, the government has the fundamental role of spurring innovation in the business sector through funding basic research in the public sector, with a clear-cut division of labor between the two, as it happened, for instance, in the cases of the development of the radar, of the Enigma machine, the first to decrypt the messages of the enemies, and finally of the Manhattan project.

Later, the linear model of innovation has been criticized in favor of the *chain model of innovation*, which conceives innovation not as a linear, unidirectional, and necessary sequence of events initiated by basic research and fundamental science, but rather as a recursive chain in which the technological sphere can also reinforce and pull science toward specific problems and domains, which eventually are translated into innovation in the market (Kline and Rosenberg 1986). Here science and technology are more interdependent, and they also interact in a circular way with the needs of the business sector.

In recent years, the *open innovation model* has further enriched this debate, in that it has shed new light on the way in which the firms, also thanks to the new technologies of information and communication, have been increasingly relying outside their borders in their relentless quest for new and more competitive sources of innovation (Chesbrough 2003; Tapscott and Williams 2006). The idea that innovation does not come (solely) from within R&D labs is

today a unanimous claim. Open innovation is a collective process aimed at generating innovation and we will see below that it is one of the main features of cultural innovation.

While according to the traditional knowledge production—so-called Mode 1—which is motivated by scientific knowledge alone (fundamental research) and is neither bothered by the applicability of its findings nor by bridging over to other disciplines, in contemporary research multidisciplinary teams—so-called Mode 2—are brought together for short periods of time to work on specific problems in the real world for knowledge production (Gibbons et al. 1994). These models have stressed that collaboration among different institutions is crucial for successful innovation. However, only marginally they have taken into account the actual and potential role that citizens and civil society could also have in shaping the innovation process (Leydesdorff and Etzkowitz 1998; Etzkowitz and Leydesdorff 2000; Chesbrough 2003; Carayannis and Campbell 2009).

Outside companies, there are also consumers, who, in some sectors, have played a fundamental role in providing insights and requests that have driven R&D in the firms toward some specific fields (Von Hippel 1998). User-driven innovation has been made possible by a decentralized and distributed way of producing innovation, which today is even more plausible thanks to ICT and tools like 3D-printers.

More generally, outside firms and their R&D labs, there is *society* with its problems, its needs, its actors, and its distributed resources. Back in the 1960s, the idea that the direction of innovation was not necessarily meeting social needs was raised by asking why the US had successfully managed possibly the most technologically complex (and expensive) ventures—for example, landing on the moon—without being able to remove the ghettos from American cities (Nelson 1977). Unfortunately, this challenge remained unsolved.

The emergence of evolutionary economics and the penetration of nonlinear thinking into Science and Technology Studies have challenged any linear-thought model. Here not only the sources of innovation lie outside firms, but also the main actors are outside them. In addition, innovation is no longer driven by technical problems or by novel scientific discoveries, it is driven by unmet social needs. More recently, the notion of *social innovation* has evolved as the development of new products, processes, organizations, or services that tackle unmet social needs and very often are developed through a bottom-up process by the prospective users and beneficiaries (Moulaert et al. 2017). At a larger scale, this is present in the *mission-oriented* innovation policy model developed by Mazzucato (2013, 2018).

We now turn to describe the *cultural dimensions of an innovation in public spaces* by contrasting it with other forms of innovation in public spaces.

2.1 Contrasted with social innovation

Social innovation takes place when a new product or service answers positively to the following three questions: (1) Does it solve a specific societal problem? (2) Does it have a fair cost? (3) Is it universally accepted? An example of social innovation is the regional healthcare card of the Region Lombardy.³ It was introduced in 1999 as a pioneering endeavor. It solved the problem of providing access to data; it enabled substantial savings; and it was accepted without any opposition. It became thus social innovation.

It is arguable that a healthcare card would meet the requirements of a successful social innovation, but not yet those of a successful

cultural innovation. Cultural innovation presupposes social innovation, but is more than that. Culture and art potentially offer non-authoritarian and self-regulated fields for interaction, reflection, and change. Building on Prahalad and Ramaswamy (2000), Pozzo and Virgili (2017) argued that the way of understanding cultural innovation would be by looking at *co-creation*,⁴ that is, by analyzing the traces that we leave behind when we have a *shared experience* of cultural *common goods*. At this level, social innovation becomes reflective and generates cultural innovation.

It seems, then, that cultural innovation must come to term with social innovation. The question is what part of social innovation is cultural innovation and what rights (Koefoed 2017) can cultural innovation claim with respect to society?

2.2 Contrasted with scientific culture

Cultural innovation does not question the role of science in knowledge production, but rather what knowledge means for individuals, and how it influences the system of beliefs and norms under which they operate as part of society. In the last two decades, the specificity of scientific culture and its role in society have become a theme much discussed at all levels of public discourse. Think of the debate about citizen scientists, lay experts, and other forms of knowledge than those produced in academia. *Scientific culture* is about the different aspects of the expression of all the modes through which individuals and society appropriate science and technology. Most policymakers now integrate scientific culture into their statements on economic growth or social progress (Godin and Gingras 2000: 43–4).

Cultural innovation, however, goes beyond scientific culture, first and foremost because scientific culture is solely about achieving and communicating the results of science, while cultural innovation concerns actually how society operates. Besides, (1) cultural innovation is about openness, while scientific culture includes openness depending on its inner scientific epistemic frames, as the current discourse about open science reveals and (2) scientific culture asks for cooperation, while cultural innovation is explicitly about co-creation (Tekic and Willoughby 2019).

In fact, the *open science paradigm* aims at changing scientific culture so that the way knowledge is produced becomes more transparent, first for the actors within the science system (the researchers) and second for those outside of it (the public). Cultural innovation transforms knowledge if and only if other actors from various parts of society are involved, and if other processes occur, in addition to changes in knowledge production. We need cultural transformations not only inside science, but also around it, and for this goal the humanities have a specific role.

3. Processes

To understand *the meaning of cultural innovation*, we have to consider co-creation, which was identified in economics as the ‘joint creation of value by the company and the customer; allowing the customer to co-construct the service experience to suit their context’ (Prahalad and Ramaswamy 2000). Co-creation is about co-designing, co-constructing, co-evaluating, and co-funding. These practices show the emergence of a new social agent, the so-called ‘prosumer’ (Helbing 2015: 194), a consumer who becomes involved with designing or customizing products for his/her own needs. The issue is highly problematic, for it is clear that even if there is no doubt that processes of co-creation occur, we cannot fully

understand their occurrence. Neither can we give an account of these processes in order to show how society could benefit from the early participation of a number of social agents. In sum, as to the co-creation of knowledge, there has been still no radical epistemic rethinking, which makes looking into cultural innovation more and more interesting.

Co-creation as part of knowledge and technology transfer assumes societal relevance. For this reason, measuring its impact is fundamental to improve social acceptance of public investment in as far as it provides a basis for aligning R&I with the values, needs, and expectations of society (ESF-SCH 2011; Kaase 2013; Zic-Fuchs 2014; Bonaccorsi 2018; ESFRI 2018; Maegaard et al. 2019). In recent years, it has become clear that co-creation plays a central role within open innovation, because:

... a specific innovation can no longer be seen as the result of predefined and isolated innovation activities but rather as the outcome of a complex co-creation process involving knowledge flows across the entire economic and social environment. (DG-RTD 2016: 11)

Co-creation requires extensive reforms of regulatory backgrounds, which means that institutional change becomes essential. To foster it, six keys of Responsible Research and Innovation have been identified in: (1) Education, (2) Ethics, (3) Gender, (4) Governance, (5) Open Access and (6) Public Engagement (Archibugi 2015; Mejlgaard et al. 2018).

One needs to keep in mind that co-creation is related to ‘the fragility of experiential knowledge’, that is, of knowledge that is not scientific but rational and robust and is produced through laypeople experiences and activities. Such knowledge is, however, fragile because ‘it is not supported by the kind of institutional framework which works quite well in the case of scientific knowledge’ (Foray 2012). It is also related to unfairness in distributing epistemic goods such as knowledge, education, and communication, which has been called ‘epistemic injustice’ (Fricker 2007). In sum, fair and unfair epistemic practices of co-creation, by elaborating on the practice of giving and taking reasons, play a role in the responsible co-creation of knowledge.

Public administrations sponsor cultural heritage and the performing arts. Custodians of memories, their responsibility is ‘to collect things and to communicate information about them in a truthful way’ (Tonner 2016). The return on investment is measured primarily in terms of visitors, but also by means of indicators of knowledge production and transfer, such as advances in scientific knowledge, training of highly skilled people and use of research infrastructures (OECD 2019). Obviously, socio-economic impact is also achieved through technology development in collaboration with companies, including high-tech SMEs (Reale et al. 2018).

We need to model for the comprehensive impact of cultural innovation at the societal level. Complexity science tells us how tiny effects can grow to prevalence, and how social networks, under different conditions, can amplify or dampen the forces running along them. Imagine trying to measure the impact of Picasso’s *Guernica*. Imagine the impact of innovation in gaming—how do you measure the impact of Grand Theft Auto (Rockstar Games) or Fortnite (Epic Games), innovation outcomes that could qualify as cultural innovation in societal sense?

We live in an era of metrics. Management of complex societies, once based on tradition, looks now for a justification to optimization criteria inspired by the scientific method: systematic observation, measurement, and experiments that bring to the validation of

hypotheses and laws. We are searching for indicators, the simpler the better, summing up complexity in figures. We look for ‘the means which, on the basis of the available evidence, has the greatest probability of attaining’ a desired goal (Merton 1936: 896). While all this functioned even beyond expectations in the field of hard sciences, its application to the realm of the social has been thwarted by the specificity of human societies—namely, nonreproducibility, unintended consequences, and the persistence of traditional solutions (what Yuval Noah Harari (2017) calls the ‘power of the written word’) to societal problems. Performance indicators lead to perverse incentives and unintended consequences. Humans address the specific measurements and its mechanisms instead of the intended objectives.

How can we improve on oversimplifying indicators? A promising approach in this regard is being pursued by the Centre for the Evaluation of Public Policies of Fondazione Bruno Kessler. The center, which is primarily aimed at carrying out public policies analysis, uses counterfactual impact evaluation tools that integrate methodologies from Computational Social Science and the Humanities.⁵ We advocate a search for those indicators that enable citizens in need of information to reflect on their decisions in a novel way (Hicks et al. 2015). Just consider, for example, how important would be, for a model of cultural innovation, to integrate ideas from Durrheim et al. (2018), showing how conflict about racism generates a relation that helps both sides of the controversy to consolidate their social identity by re-appropriating stigmatized labels.

We measure cultural innovation in terms of co-creation. However, the use of data for reconstructing cultural innovation is praiseworthy, but not simple. Agent-based simulation, which allows the reproduction and study of social life *in silico*, could be used to such a purpose. Simultaneously modeling the agents’ micro-processes (with mental constructs such as beliefs, desires, intentions, values, etc.) at the same time as their macro processes (social interaction), simulation enables us to understand core phenomena of the social world and its dynamics, such as trust, norms, and cooperation (Conte and Paolucci 2014).

A concrete example is the existing Impactomatrix classification of DARIAH-Digital Research Infrastructure for the Arts and Humanities, which consists of twenty-one impact areas based on an intensive literature review:

External Impact – Education – Data Security/Safety – Dissemination – Effectivity – Efficiency – Funding Perspective – Innovation – Integration – Coherence – Collaboration – Communication – Transfer of Expertise – Sustainability – Usage – Publications – Relevance – Reputation – Transparency – Competitiveness – Transfer of Knowledge.⁶

These areas constitute points of attention that produce an extensive basis for evaluating the outcomes of cultural innovation, but exhibit partial overlap and might be in general difficult to calculate in absence of an underlying model. As a first step in the direction of a model, here we propose a reorganization of the impact areas into the five processes that we discuss in the rest of this section.

3.1 Access

Measuring the number of users of knowledge produced per discipline within the humanities can be seen as a murky concept, especially since cross-disciplinary research is becoming more widespread. A starting point could be to estimate the number of users per discipline connected with or using a research infrastructure (Zic-Fuchs 2014). For example, it is arguable that during the last twelve months, more

images have been produced than in the whole history of photography. We are talking of a patrimony that is not only stored and accessed digitally, but, in as far as tagging is performed by third parties, it is also co-created, which calls for capacity building, so that it generates actual participation, a technological vision that is inclusive for everybody (Eleta and Golbeck 2012).

3.2 Participation

The Rome Declaration for Responsible Research and Innovation in Europe has made it clear that participation is the issue (DG-RTD 2014), which turns out convenient for our argument, given that cultural innovation is about co-creation. Indeed, cultural innovation relies on the participation of groups of civil society that take part in co-creation processes.

As regards participation at the individual level, we must realize that there are still a number of social groups that are excluded or avoid engaging in participatory and co-creation activities. For this reason, cultural innovation needs to envisage (self)excluded individuals and groups together with the causes of (self)exclusion (Wyatt 2003). To name an example, diversity has become a structural element of contemporary societies, with migration at the core of generative dynamics of our social, economic, and political texture (Fonseca et al. 2018).

Communities of practice (Lave and Wegener 1991) can be seen as a means for shaping cultural innovation outcomes and as particularly fertile ground for experimenting with indicators. Examples of communities of practice can be found within DARIAH’s currently twenty-one active working groups, which are run voluntarily by their members, and in which activities of co-creation and collaboration take place among scholars from different levels.⁷

3.3 Use

Although there might be some overlap between having access to datasets and using them, the difference becomes remarkable in today’s sharing practices of data initiated by user crowds (Zook et al. 2015), which are having a substantial impact on public policies. Today, legislators have realized that ‘new uses have emerged as well as new actors and new business models’, whose uploading and downloading of cultural contents have become processes that require constant monitoring.⁸ Digital infrastructures have reshaped the technological landscape of our cities. First results indicate an increase in understanding and awareness of the approach among humanities and ICT researchers. On the other side, the obsession for surveillance and control has conquered our collective imagination and shaped the work of urban planners, administrators, policy-makers, and entrepreneurs consequently (Morozov and Bria 2018).

For these reasons, the third process we propose to look into is user data flows (Ridge 2014) in as far as they induce open innovation. The most urgent goal is to overcome barriers to participation and to receive valuable inputs from citizens (Maynard and Lepori 2017). There are, however, difficult problems of definition, standardization, normalization. There are problems with data sources as well as with data quality, to say nothing of cross-country comparison difficulties and complex multilingual aspects to deal with.

3.4 Reflection

Reflection is the ability of the individual to single out from the whole indiscriminate mass of the stream of floating content certain fixed elements in order to isolate them and to concentrate attention upon them. The term reflection (Rescher and Grim 2012) describes

a process that relies on individuals who reflectively appropriate culture and become producers of new knowledge.

Reflection is a process, a general function of the human mind that isolates ‘from the whole wavering dream of images rushing through the senses’, collects ‘into a moment of waking’, dwells ‘on one image spontaneously’, observes ‘it dearly and more quietly’, and finally abstracts certain characteristics showing him/her ‘that this and no other is the object’ (Herder 2002: 55; see also Cassirer 1944: 60–1).

The *reflective society* is a term that—like cultural innovation—has found wide usage in research policy since a precise date, in this case the fall of 2013, when it was introduced for posting Social Sciences and Humanities-related calls within the *Horizon 2020* societal challenge named ‘Inclusive, Innovative and Reflective Societies’.⁹ The term is based on the work done on reflection by Kant (1790), Beck et al. (1996), and Ferrara (1998). The *self-reflective society* refers to the deliberative communication of citizens in a modern public sphere aimed at mutual understanding (Fishkin 1992), for example, our attitudes toward rethinking artificial intelligence, human enhancement, fragmentation of knowledge, attention spans, and data access. A closer scrutiny reveals that Habermas (1973) has applied to society what Hegel (1813) had elaborated as the passage from the surface of being to the ground of essence, a passage that takes place, literally, by *reflecting into the thing*—like reflected light that illuminates something previously invisible, or creates a pattern not previously existing. Insisting on reflection helps to raise awareness for the importance of framing issues around engaging with science and society, identifying problems, and defining solutions (Pozzo 2019).

Reflection has been mobilized in claims for humanities involvement in hard-science research asking for scientists, scientific practices, the governance of science, and indeed modern society to become more reflective. What the humanities can add—which has taken a very explicit form in the shape of Science and Technology Studies—is a reflection on society, culture, and the notion of human being. For this reason, reflection has become a recognized common denominator for policies in education, culture, and research, and it is useful to remind that the *Faro Framework Convention on the Value of Cultural Heritage for Society* (Council of Europe 2005) encourages reflection on the role of citizens in the process of defining, creating, and managing a cultural environment in which communities evolve.

3.5 Inclusion

Inclusion means granting access to the social process of sharing one’s own reflection in participatory co-creation processes. On the societal level, the places where co-creation takes place are *spaces of exchange* in which citizens engage in the process of *sharing experiences* while appropriating *common goods* content. We are talking of public spaces such as libraries, museums, science centers, but also of any place in which co-creation activities may occur. Research infrastructures are a good example, because they foster new ways of knowledge production inside research performing organizations, which in turn are influenced by and are influencing the engagement of the humanities with society at large. In our quickly changing society, we face issues of multiculturalism and migration, innovation and sustainability, security and freedom. In recent years, inclusion has become one of the most dominant values and objectives in education (Felder 2018: 54). Today, we are looking at a crisis of trust in traditions and cultures. We need new narratives that require efforts for logic, society, and personality. The issue is communication toward a harmonic blending of cultures. In fact, ‘culture cannot be but plural, changing, adaptable, constructed. ... A culture

that does not change and exchange with other cultures is a dead culture’ (Dervin 2012: 183). A big step toward cultural innovation is the realization that culture is openness to inclusion.

4. Outcomes

Outcomes are innovative products, processes, or methods that imply changes in the lives of beneficiaries. We might say that cultural innovation influences behavior change. It innovates culture in the anthropological sense of the term. In this sense, cultural innovation takes place when we can say that the museum and historiographical reconstruction of the Holocaust in Berlin in recent decades has managed to change the orientations of the German people with respect to the history and memory of the twentieth century. The emphasis is on outcome measurements that are useful both to the cultural organization and to prospective impact investors as well as to donors (Ratti 2015), with museums as main examples (Castañer 2014). Generally speaking, cultural innovation takes place if a change in the behavior of the population can be monitored with respect to objectives of social inclusion, human rights defense, environment protection, etc.

The perspective of the social behavior of final recipients is what decides whether a cultural innovation has been successful or not. A clarification of outcomes is necessary to examine how cultural innovation changes our view at innovation in general. Especially, we have to examine the implications of innovation for redefining the ways in which culture has been envisioned and the various ways in which users engage with cultural processes and contents in the past, present, and future.

For this reason, we define *outcomes of cultural innovation* in terms of the following features:

1. *Fostering open innovation*. Cultural innovation itself is necessarily open innovation because culture is understood as shared in society. Moreover, a cultural innovation should contribute to the character of openness of innovations in other forms, for example, technological innovation or innovation in the public administration. Besides, in the public sector as well as in other sectors, research infrastructures are data-driven. Consequently, their management systems are designed in an open data context.
2. *Improving welfare*. This feature of cultural innovation is shared with social innovation, namely the improvement of the welfare of individuals or communities, for both are innovations ‘defined by their (social) objectives to improve the welfare of individuals or communities’ (OECD 2018: 20).
3. *Transmitting heritage*, the content of culture, from UNESCO world heritage sites to all kinds of local collections.
4. *Fostering creativity*. Cultural and creative industries address this feature. Creativity is the process of creating new experiences out of existing materials, which are common goods.
5. *Experiencing beauty*, a philosophical condition, which requires a politics of beauty (Hillman 2006).

On the basis of these five features, *outcomes of cultural innovation can be defined as products or services that represent an open innovation that improves social welfare by creatively processing beauty-laden heritage content in a reflective and inclusive way*.

5. Operationalization

Before closing, we need to prove that the theoretical framework outlined in this article is adequate by showing it in practice. Especially,

we wish to discuss ways to operationalize the definitions introduced in the preceding sections in some empirical case studies.

After dealing with economics, management, and philosophy, let us consider the structural function of research frameworks in sustaining cultural innovation. What is the relationship between research infrastructures in the humanities and cultural innovation? Research infrastructures foster innovation by providing access to services and knowledge. First and foremost, they are *knowledge infrastructures* that enhance the human factor (Borgman et al. 2013). They are *common goods* in the substantive sense of what is shared and beneficial for all members of a community. They are planned, built, and managed for serving large research communities that operate in diversified sectors on the principles of open access and competition.

There is the thought of a continuum of how participation and shaping of innovation for society can be supported, initiated, triggered by specific research infrastructures. They are ‘among the first known infrastructures’: traditional libraries, museums, and archives being ‘the most obvious examples of this legacy’. In today’s digital single market of Europe, for example, they are expected to ‘enhance research into the historical, social, economic, political and cultural contexts of the European Union, providing data and knowledge to support its strategies’ (ESFRI 2018: 107).

Research infrastructures are pivotal for cultural innovation in society in as far as they foster innovative forms of collaboration among scientists and help researchers to produce excellent, digitally enabled open-data scholarship that is reusable, visible, and sustainable, thus contributing to the understanding of the cultural, economic, social, and political life in Europe and beyond.

Migration offers compelling examples for the impact of cultural innovation because it implies transfers of cultures, knowledge, and competencies. Migration is occasion of encounters as well as of misunderstandings and conflicts (Cousins and Daley 2017). At the regional level, cultural innovation has two main areas of impact as regards inclusion, namely by (1) conceptualizing reasons, needs, challenges, and keys of changes under diverse backgrounds; (2) co-designing, testing, and practicing integration-related issues. Current trends of radicalization versus integration have made it clear with an extraordinary force that a most urgent objective is to work toward societies that are reflective, inclusive, and attentive to the effects that migration is having on security and health, environment and biodiversity, and especially on society and culture.

Imagine a second-generation Sino-Italian teenager who attends a humanities secondary school in Italy. At a certain point, s/he might be asked to read a text by Plato, possibly the *Apology of Socrates*—first in Italian, then perhaps in the Greek original or in the Renaissance Latin rendering of Marsilius Ficinus. Students today delve easily into multilayered, multilingual hypertexts, and they do so on the basis of the reciprocal guidance made possible by social reading tools (Roncaglia 2018). Our student ought to be able to read the same text in modern unified Chinese as well, so that s/he might start a discussion on Socrates in his/her Chinese-speaking family. Inversely, schoolmates might appropriate, say, Confucius’ *Analects* through the conceptual references indicated by our student. Together they might start a discussion on (dòng, movement), (jìng, rest), (rénjī, human being), (rén, humaneness), and eventually come to grasp some key tenets of Neo-Confucianism, such as the dictum ‘restoring the Heavenly Principle and diminishing human desires’ (Tu Weiming 2010).

An analysis of this case study allows a coherent application of the processes set forth in the previous section: access,

participation, use, reflection, and inclusion. It is clear that the students are delving in and for an institution, their school. They do what they do because they have gained *access* to common goods (first process), and they are ready to set a community of practice in which others might ask to *participate* (second process), while leaving *digital flows*, which can be either manifest or hidden (third process), in order to individually *reflect* on diversity (fourth process) and eventually share *inclusion* at the societal level (fifth process).

An additional example is the line of research on religious innovation carried out at the Centre for Religious Studies of Fondazione Bruno Kessler. The center pays particular attention to the dynamic texture of religious communities and traditions as well as to the contextuality of social, cultural, and technological innovations, thus avoiding reductive definitions of either religion or innovation. Following an action-research approach, the center’s work focuses on the role of digital technologies in processes of social change. It explores the potentials of technology-assisted and technology-enabled social innovation in collaboration with researchers in ICT.¹⁰

The analysis of religious innovation confirms the validity of the five processes of cultural innovation. New religious groups *access* cultural legacies (first process) and constitute *communities of practice* while elaborating on them (second process), while leaving traces in form of *user data* (third process), in order to individually *reflect* on common goods (fourth process) and eventually achieve social *inclusion* by sharing experiences (fifth process).

6. Impact on policies

Cultural innovation has an impact on interconnected domains: education, science, and heritage in the first instance, but also society, policy, and the economy. It achieves impact (1) by raising awareness in the civil society thanks to the engagement of stakeholders in co-creation processes, (2) by establishing wide audiences, targeting stakeholders, and involving them proactively in designing and evaluating narratives and finally (3) by enabling cooperation of diverse actors and partners.

Institutions that are responsible for the production and the circulation of knowledge have been continuously changing due to Internet technologies, such as social media, big data, open-source software, ubiquitous computing, and Wikipedia (Borgman et al. 2013). Not by chance, then, the key performance indicator for the ‘Science with and for Society’ cross-cutting area of *Horizon 2020* is the ‘number of institutional change actions promoted by the programme’.¹¹

We conclude by distilling our arguments about dimensions, processes, and outcomes into a comprehensive definition that might be useful for widening participation in cultural innovation, which we think is the most relevant practical result of the theoretical endeavor undertaken in this article.

Cultural innovation (2.0) can be understood as the outcome (4.0) of complex co-creation processes (3.0) that involve the reflection (3.4) of knowledge flows across the social environment within communities of practices (3.2) while fostering the inclusion (3.5) of diversity within society. It takes a critical stance against inequalities in the distribution (3.1) and use (3.3) of knowledge and builds innovation for improving the welfare of individuals and communities.

As regards policy recommendations on the role of actors such as the ministries of research, economics, and culture for widening

participation in cultural innovation (Yúdice 2018), a richer approach based on complexity science and social simulation and declined via the processes and outcomes proposed in this article might help. Policymakers could develop evidence-based policies for multilevel reforms in cooperation with researchers and cultural practitioners and a direct and pro-active multistakeholder involvement (e.g. firms, non-profit, NGOs, unions, users, local authorities, and policymakers), exploiting existing data sources (e.g. Eurobarometer sources at EU level) to provide empirical evidence.

For such *cross-fertilization*, all the institutions that make *public spaces* possible must be taken into consideration. Considering the conceptual, cultural, and behavioral barriers to co-design (Jackson et al. 2018), one should include ministries, consulting organizations, teaching establishments at all levels, the media, museums, public libraries, scientific leisure clubs, and organizations devoted to the promotion and diffusion of science and technology.

We think the definition we have elaborated for cultural innovation will trigger changes in the mindset as regards locating culture for reflection and inclusion in education, life-long learning, health-care, urban development and regeneration. First and foremost, however, for a change in the mindset about cultural common goods (Graeffe 2017). Culture cannot be but plural, changing, adaptable, constructed. Reflection and inclusion are constructed whenever we are in contact with other human beings, regardless of where they come from. This we have to learn.

Notes

1. The Roadmaps 2016 and 2018 of the ESFRI-European Strategy Forum on Research Infrastructures embrace six groups of research infrastructures: DAT-Data, Computing, and Digital Research Infrastructures, ENE-Energy, ENV-Environment, H&F-Health and Food, PSE-Physics and Engineering, and SCI-Social and Cultural Innovation (ESFRI 2018). Currently, six *research infrastructures for cultural innovation* are up and running at various stages, given that the ESFRI distinguishes three levels of maturity: (1) ESFRI Landmarks; (2) ESFRI Projects; (3) High strategic potential areas of research (ESFRI 2018). They are in the box below:

- CLARIN ERIC-Common Language Resources and Technology Infrastructure, listed as an ESFRI Landmark, is a large-scale pan-European collaborative effort to create, coordinate, and make language resources and technologies available and readily usable.
- DARIAH ERIC-Digital Research Infrastructure for the Arts and Humanities, listed as an ESFRI Landmark, is the first permanent European digital infrastructure for the Arts and Humanities.
- EHRI-European Holocaust Research Infrastructure, listed as an ESFRI Project, supports the Holocaust research community by building a digital infrastructure and facilitating human networks.
- E-RIHS-European Research Infrastructure for Heritage Science, listed as an ESFRI Project, creates synergies for a multidisciplinary approach to heritage interpretation, preservation, documentation, and management.
- OPERAS-Design for Open access Publications in European Research Area for Social Sciences and Humanities coordinates and pools university-led scholarly communication activities in Europe in the Social Sciences and Humanities to enable open science as standard practice. It is an H2020 funded project that operates in

the ESFRI's high strategic potential area of intervention Digital Service for Open Science Research.

- REIRES-Research Infrastructure on Religious Studies collects historical documents and current information on global theological-political issues while fostering interfaith dialogue. It is an H2020 funded project that operates in the ESFRI's high strategic potential area of intervention Religious Studies (ESFRI 2018: 106–15).
2. For example, the Fondazione CARIPLIO has launched a funding instrument for *Cultural Innovation*, see <<http://www.fondazionecripio.it/it/progetti/arte/innovazione-culturale/index.html>> retrieved 2 Nov 2019.
 3. See <<http://www.regione.lombardia.it/wps/portal/istituzionale/HP/DettaglioServizio/servizi-e-informazioni/cittadini/diritti-e-tutele/carta-regionale-e-nazionale-servizi>> retrieved 2 Nov 2019.
 4. See <<https://ec.europa.eu/research/participants/portal/desktop/en/support/faqs/faq-2992.html>> retrieved 2 Nov 2019: 'Co-creation refers to all societal actors working together during the whole research and innovation process to align research and innovation with the values, needs and expectations of European society'.
 5. See <<https://irvapp.fbk.eu/about-us>> retrieved 2 Nov 2019.
 6. See <<https://dariah-de.github.io/Impactomatrix/>> retrieved 2 Nov 2019.
 7. See <<https://www.dariah.eu/activities/working-groups-list/>> retrieved 2 Nov 2019.
 8. See the *Proposal of a Directive of the European Parliament and of the Council on Copyright in the Digital Single Market* voted on 27 March 2019. COM(2016) 593 final 2016/0280(COD): Executive Summary and Articles 11 and 13.
 9. See <<http://ec.europa.eu/programmes/horizon2020/en/h2020-section/europe-changing-world-inclusive-innovative-and-reflective-societies>> retrieved 2 Nov 2019.
 10. See the ISR-FBK homepage <<https://isr.fbk.eu/en>> retrieved 2 Nov 2019, which includes a link to the position paper 'Religion and innovation: Calibrating research approaches and suggesting strategies for a fruitful interaction'.
 11. See 'Commission Staff Working Document Horizon 2020 Annual Monitoring Report 2015', 48.

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References

- Archibugi, D., Denni, M., and Filippetti, A. (2009) 'The Technological Capabilities of Nations: The State of Art of Synthetic Indicators', *Technological Forecasting and Social Change*, 76/7: 917–31.
- , ed. (2015) *The Contribution of the European Commission to Responsible Research and Innovation: A Review of the Science in Society (FP6) and Science and Society (FP7) Programmes*. Rome: CNR Press.
- Beck, U., Giddens, A., and Lash, S. (1996) *Reflexive Modernisierung*. Frankfurt: Suhrkamp.

- Bijker, W., Hughes, T., and Pinch, T., eds (2012) *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, MA: MIT Press.
- Bonaccorsi, A. (2018) 'Towards an Epistemic Approach to Evaluation in SSH'. In: A., Bonaccorsi (ed.) *The Evaluation of Research in the Social Sciences and Humanities: Lessons from the Italian Experience*, pp. 1–29. Berlin: Springer.
- Bontems, V. K. (2014) 'What Does Innovation Stand for? Review of a Watchword in Research Policies', *Journal of Innovation Economics and Economics*, 15/3: 39–57.
- Borgman, C. L., Edwards, P. N., Jackson, S. J., Chalmers, M. K. et al. (2013) *Knowledge Infrastructures: Intellectual Frameworks and Research Challenges*. Ann Arbor, MI: Deep Blue.
- Bush, V. (1945) *Science: The Endless Frontier*. Washington, DC: US Government Printing Office.
- Carayannis, E., and Campbell, D. (2009) 'Mode 3' and 'Quadruple Helix': Toward a 21st Century Fractal Innovation Ecosystem', *International Journal of Technology Management*, 46: 201–34.
- Cassirer, E. (1944) *An Essay on Man*. New Haven, Conn.: Yale University Press.
- Castañer, X. (2014) 'Cultural Innovation by Cultural Organizations.' In: V. A., Ginsburgh, and D., Throsby (eds.) *Handbook of the Economics of Art and Culture*, Vol. 2, pp. 261–76. Oxford: North Holland.
- Chesbrough, H. W. (2003) *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Cambridge, MA: Harvard University Press.
- Conte, R., and Paolucci, M. (2014) 'On Agent-Based Modeling and Computational Social Science', *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2014.00668>.
- Council of Europe (2005) *Faro Framework Convention on the Value of Cultural Heritage for Society*. Strasbourg: Council of Europe.
- Cousins, J., and Daley, B. (2017) 'Making Europe: Cultural Heritage Campaign to Show Migration Is Part of the European Identity', *Cartaditalia*, 1: 109–21.
- Dervin, F. (2012) 'Cultural Identity, Representation, and Other'. In: J., Jackson (ed.) *The Routledge Handbook of Language and Intercultural Communication*, pp.181–94. London: Routledge.
- DG-RTD (2014) *Rome Declaration on Responsible Research and Innovation in Europe*. Brussels: EC.
- (2016) *Open Science, Open Innovation, Open to the World: A Vision for Europe*. Brussels: EC.
- Durrheim, K., Mukadder, O., Tawli, M. S., García-Sánchez, E. et al. (2018) 'How Racism Discourse Can Mobilize Right-Wing Populism: The Construction of Identity and Alliance in Reactions to UKIP's Brexit Breaking Point Campaign', *Journal of Community & Applied Social Psychology*, 28/6: 385–405.
- Eleta, I., and Golbeck, J. (2012) 'A Study of Multilingual Social Tagging of Art Images: Cultural Bridges and Diversity', *Proceedings of the ACM 2012 Conference Computer Supported Cooperation Work CSCW*, 12: 695–704.
- ESFRI (2018) *ESFRI-European Strategy Forum on Research Infrastructures: Roadmap 2018*. Brussels: EC.
- ESF-SCH (2011) *Research Infrastructures in Digital Humanities: Science Policy Briefing 42*. Strasbourg: ESF.
- Etzkowitz, E., and Leydesdorff, L. (2000) 'The Dynamics of Innovation: From National System and 'Mode 2' to a Triple Helix of University-Industry-Government Relations', *Research Policy*, 29: 109–23.
- Felder, F. (2018) 'The Value of Inclusion', *Journal of Philosophy of Education*, 52/1: 54–70.
- Ferrara, A. (1998) *Reflective Authenticity*. London: Routledge.
- Fishkin, J. S. (1992) *The Dialogue of Justice: Towards a Self-Reflective Society*. New Haven, CT: Yale University Press.
- Fonseca, X., Lukosch, S., and Brazier, F. (2018) 'Social Cohesion Revisited: A New Definition and How to Characterize It', *Innovation: The European Journal of Social Science Research*, 32/2: 231–53.
- Foray, D. (2012) 'The Fragility of Experiential Knowledge'. In: R., Arena, A. Festré, and N., Lazaric (eds.) *Handbook of Knowledge and Economics*, pp. 267–84. London: Elgar.
- Fricker, M. (2007) *Epistemic Injustice: Power and the Ethics of Knowing*. Oxford: Oxford University Press.
- Gibbons, M., Limoges, C., Nowotny, H., Schwartzmann, S. et al. (1994) *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*. Thousand Oaks, CA: Sage.
- Godin, B. (2007) *National Innovation Systems: The System Approach in Historical Perspective*. Montréal, QC: Centre Urbanisation Culture Société.
- Godin, B. (2009) *The Making of Science, Technology and Innovation Policy: Conceptual Frameworks and Narratives, 1945-2005*. Montréal, QC: Centre Urbanisation Culture Société.
- (2015) *Innovation Contested: The Idea of Innovation over the Centuries*. London: Routledge.
- , and Gingras, Y. (2000) 'What Is Scientific and Technological Culture and How Is It Measured? A Multidimensional Model', *Public Understanding of Science*, 9: 43–58.
- Graeffe, X. (2017) 'Cultural Heritage as a Common Good', *Cartaditalia*, 1: 207–20.
- Habermas, J. (1973) 'Wahrheitstheorien'. In: H., Fahrenbach (ed.) *zum Wirklichkeit und Reflexion: Walter Schulz 60. Geburtstag*, pp. 211–65. Pfullingen: Neske.
- Harari, Y. N. (2017) *Homo Deus: A Brief History of Tomorrow*, Rev. edn. London: Vintage.
- Hegel, G. W. F. (1813) *Wissenschaft der Logik*. Nürnberg: Schrag.
- Helbing, D. (2015) *The Automation of Society is Next: How to Survive the Digital Revolution*. Scotts Valley, CA: CreateSpace.
- Herder, J. G. (2002) 'Abhandlung über den Ursprung der Sprache (1770)'. In: M. N., Forster (ed.) *J. G. Herder: Philosophical Writings*, Suphan edn, Vol. 5, pp. 34–5. Cambridge: Cambridge University Press.
- Hicks, D., Wouters, P., Waltman, L., de Rijcke, S. et al. (2015) 'Bibliometrics: The Leiden Manifesto for Research Metrics', *Nature*, 520/7548: 429–31.
- Hillman, J. (2006) *City and Soul*. Berlin: Springer.
- Holt, D. B., and Cameron, D. (2012) 'Cultural Innovation: Triumph of a Better Ideology', *Market Leader*, 1: 24–7.
- Jackson, P., Mavi, R. K., Suseno, Y., and Standing, C. (2018) 'University-Industry Collaboration with the Triple Helix of Innovation: The Importance of Mutuality', *Science and Public Policy*, 45/4: 553–64.
- Jöstingmeier, B., and Boeddrich, H.-J. (2005) *Cross-Cultural Innovation: Results of the 8th European Conference on Creativity and Innovation*. Berlin: Springer.
- Kaase, M. (2013) 'Research Infrastructures in the Social Sciences: The Long and Winding Road'. In: B., Kleiner, I., Renschler, B., Wernli et al. (eds.) *Understanding Research Infrastructures in the Social Sciences*, pp. 19–30. Berlin: Seismo.
- Kant, I. (1790) *Kritik der Urteilskraft*. Berlin: Lagarde.
- Kline, S. J., and Rosenberg, N. (1986) 'An Overview of Innovation'. In: R., Landau, N., Rosenberg (eds.) *The Positive Sum Strategy*, pp. 275–305. Washington, DC: National Academy Press.
- Koefoed, O. (2017) 'Cultural Heritage and Social Innovation: A Memory of the Future?', *Cartaditalia*, 1: 417–44.
- Lave, J., and Wegener, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.
- Leydesdorff, L., and Etzkowitz, E. (1998) 'The Triple Helix as a Model for Innovation Studies', *Science and Public Policy*, 25/3: 195–203.
- Lundvall, B. A. (1998) 'Innovation as an Interactive Process: From User-Producer Interaction to the National System of Innovation'. In: G., Dosi, C., Freeman, G., Silverberg et al. (eds.) *Technical Change and Economic Theory*, pp. 61–84. London: Pinter.
- Maegaard, B., Pozzo, R., Melloni, A., and Woollard, M. eds. (A.2019) *Stay Tuned to the Future: Impact of the Research Infrastructures for Social Sciences and Humanities*. Firenze: Olshki.
- Maynard, D., and Lepori, B. (2017) *Ontologies as Bridges Between Data Sources and User Queries: The KNOWMAK Project Experience*. Paris: Science, Technology and Innovation Indicators.
- Mazzucato, M. (2013) *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*. London: Anthem Press.
- (2018) *Mission-Oriented Research and Innovation in the European Union: A Problem-Solving Approach to Fuel Innovation-Led Growth*. Brussels: EU.

- Mejlgaard, N., Bloch, C., and Bargmann Madsen, E. (2018) 'Responsible Research and Innovation in Europe: A Cross-Country Comparative Analysis', *Science and Public Policy*, 46/2: 198–209.
- Merton, R. K. (1936) 'The Unanticipated Consequences of Purposive Social Action', *American Sociological Review*, 1/6: 894–904.
- Morozov, E., and Briar, F. (2018) *Rethinking the Smart City: Democratizing Urban Technology*. New York: Rosa Luxemburg Stiftung.
- Moulaert F., Mehmood A., MacCallum D. et al., eds. (2017) *Social Innovation as a Trigger for Transformations*. Luxembourg: EC.
- Nelson, R. R. (1977) *The Moon and the Ghetto*. New York: Norton.
- , and Rosenberg, N. (1993) 'Technical Innovation and National Systems'. In: R., Nelson (ed.) *National Innovation Systems: A Comparative Analysis*, pp. 3–21. Oxford: Oxford University Press.
- OECD (2018) *Oslo Manual: The Measurement of Scientific and Technological Activities: Proposed Guidelines for Collecting and Interpreting Innovation Data*, 4th edn. Paris: OECD, EC, Eurostat.
- (2019) 'Reference Framework for Assessing the Scientific and Socio-Economic Impact of Research Infrastructures', *OECD Science and Technology Policy Papers*, 65: (March), doi: 10.1787/3ffee43b-en.
- Pozzo, R. (2019) 'Innovation for the Reflective Society', *fteval Journal for Research and Technology Policy Evaluation*, 46: 53–5.
- , and Virgili, V. (2017) 'Social and Cultural Innovation: Research Infrastructures Tackling Migration', *Diogenes*, 64. <https://doi.org/10.1177/0392192117739822>.
- Prahalad, C. K., and Ramaswamy, V. (2000) 'Co-Opting Customer Competence', *Harvard Business Review*, 78/1: 79–87.
- Ratti, M. (2015) 'Outcome Indicators for the Cultural Sector', *Economia della Cultura*, 25/1: 23–46.
- Reale, E., Avramov, D., Canhial, K. et al. (2018) 'A Review of Literature on Evaluating the Scientific, Social and Political Impact of Social Sciences and Humanities Research', *Research Evaluation*, 27/4: 298–308.
- Rescher, N., and Grim, P. (2012) *Reflexivity: From Paradox to Consciousness*. Heusenstamm: Ontos.
- Ridge, M., ed. (2014) *Crowdsourcing Our Cultural Heritage*. London: Routledge.
- Roncaglia, G. (2018) *L'età della Frammentazione: Cultura del Libro e Scuola Digitale*. Bari: Laterza.
- Tapscott, D., and Williams, A. (2006) *Wikinomics: How Mass Collaboration Changes Everything*. London: Atlantic Books.
- Tekic, A., and Willoughby, K. (2019) 'Co-Creation – Child, Sibling or Adopted Cousin of Open Innovation?', *Innovation*, 21/2: 274–97.
- Tonner, P. (2016) 'Museums, Ethics and Truth: Why Museums' Collecting Policies Must Face Up to the Problem of Testimony', *Royal Institute of Philosophy Supplement*, 79: 159–77.
- Tu Weiming (2010) *The Global Significance of Concrete Humanity: Essays on the Confucian Discourse in Cultural China*. New Delhi: Centre for Studies in Civilizations.
- Von Hippel, E. (1998) *The Sources of Innovation*. Oxford: Oxford University Press.
- Wyatt, S. (2003) 'Non-Users Also Matter: The Construction of Users and Non-Users of the Internet'. In: N., Oudshoorn, and T., Pinch (eds.) *How Users Matter: The Co-Construction of Users and Technology*, pp. 67–79. Cambridge, MA: MIT Press.
- Yúdice, G. (2018) 'Innovations in Cultural Policy and Development in Latin America', *International Journal of Cultural Policy*, 24/5: 647–63.
- Žic-Fuchs, M. (2014) 'Research Infrastructures in the Humanities: The Challenges of Visibility and Impact'. In: A., Duşa, D., Nelle, G. Stock et al. (eds.) *Facing the Future: European Research Infrastructures for the Humanities and Social Sciences*, pp. 121–33. Berlin: Scivero.
- Zook, B. M., Graham, M., and Boulton, A. (2015) 'Crowd-Sourced Augmented Realities: Social Media and the Power of Digital Representation'. In: S. P., Mains, J., Cupples, and C., Lukinbeal (eds.) *Mediated Geographies and Geographies of Media*, pp. 223–240. Berlin: Springer.