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Designing for conviviality

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ABSTRACT

The aim of this paper is to advance systemism (an ontological framework that accommodates both agency and social structure, stressing that everything is a system or part of a system) as a better suited ontological framework for giving an account of the role of technologies in the formation of a good society. Building on Ivan Illich's systemic understanding of a convivial society, my secondary aim is to provide a matrix for the ethical design of technologies meant to foster conviviality. I will argue that such an ethical matrix could overcome strictly individualistic or holistic understandings of the social realm, by admitting that the social change provoked by technology is affecting both the social fabric of the concerned society and the individual which is part of the social structure concerned.

1. Introduction

A critical analysis of the new technologies (roughly, the Internet and all the applications/devices made possible by it, alongside ambient and artificial intelligence, virtual reality, robots and so on) and of their role in pushing forward a good society is by no means an easy task. Such an endeavor demands not only an evaluation of particular issues raised by the use or misuse of these new tools, but also of their societal impact. If one wants to reach a more comprehensive understanding, a first step would be to set forth an ontological evaluation "helpful for reflecting on the fundamental assumptions about the social that underlie the study and evaluation of technology" [5 p. 2].

I start by making explicit the social ontological and methodological presuppositions in current strands of thinking about technology. I claim that such typically hidden assumptions about the nature of the social realm also inform our understanding of technologies and their impact at a societal level. I advance systemism (described below) and claim that it is a better suited ontological framework for giving an account of the role of technologies in the advancing a good society. I will do so by pinpointing the shortcomings of the two most common ontological frameworks, i.e., individualism and holism. Individualism focuses on the impact of technologies on individual users, ignoring society as a whole, while holism overlooks the agent(s) using the technologies, treating society and technology as two irreducible entities. Systemism remedies these deficiencies by acknowledging that society is neither a sum of random individuals, nor a homogeneous unity. It accommodates both agency and structure by admitting the complex, inter-relational and mutually shaping processes between individuals and society. When applied to technology, systemism has the benefit of seeing the artificial or virtual realm as a subsystem of society that both affects it and is affected by it. As such, the micro and macro levels are integrated in analyses concerning the role of technologies in actualizing good societies.

Because systemism seems a fuzzy and complicated ontological framework, I will appeal to a systemist thinker, Ivan Illich, who examines the role of tools in the emergence of convivial societies. Good societies are made possible only by convivial tools which enhance both the user's autonomy and social cohesion. Building on Ivan Illich's systemic understanding of a good society, my secondary aim is to provide a matrix for the ethical design of technologies meant to foster conviviality. This matrix, which rests on the assumption that technology both shapes and is shaped by society, provides a way for understanding how individual and societal values should be addressed in technology design so as to push forward better societies.

Although I use the catch-all phrase 'technology' throughout this essay, I am primarily concerned with the subset of such technologies that run through the Internet. I start from the assumption that it is a mistake to treat technology as a homogeneous unity. Branches of technology (military technology, medical technology, information and communication technologies) have their

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specificities and, as such, must be discussed on their own terms, since a desirable design criterion for one branch (for example, open source in information and communication technologies) might have catastrophic consequences when applied to another branch (just imagine open-source pace-makers or unmanned combat aerial vehicles[1]).

2. An ontological assessment of current strands of thinking about technology

When thinking about the relation between technologies and the good society many tend to refer to two different domains. One has as its focus the technical or engineering aspects of new tools. The other is concerned with ideals and values that form the structure of a good society. However, keeping these inquires separated does not lead us very far when trying to pinpoint the link or impact of these new technologies on a societal level and vice versa. And this is due to the fact that "evaluations about the new technologies are never just about technology" [5, p. 3]. Technologies and societies are deeply interconnected by mutually shaping processes [9], which demands bridging the gap between technical and evaluative analyses. Such a task can be accomplished by adopting a systemic view of the relationship between society and the Internet.

In what follows I will highlight the shortcomings of two classical ontological frameworks, individualism and holism, frameworks which infuse analyses of technologies and their role in the formation and maintaining of a good society. Drawing on the works of Mario Bunge [7,8,17,18], I argue that systemism offers the most suitable conceptual scheme for clarifying the dynamic among individuals, communities and technology. Societies, in a systemic view, are systems of correlated individuals. This ontological framework combines the explanatory powers of individualism and holism while avoiding their shortcomings [7,8]. It also has the benefit of taking into account "social values (ignored by individualism) as well as individual values (ignored by holism)" [8, p.157]. Moreover, such a conceptual framework would admit that the social change provoked by technology is affecting both social structure and the individual that acts within the respective social structure.

2.1. Individualism and holism

The link between technologies and the good society is usually conceptualized within an individualistic or reductionist ontological framework [5 p. 1, 6 p. 326]. Individualism, be it ontological or methodological, explains any kind of social phenomenon in terms of individual behaviors. The basic assumption is that bigger scale processes can be logically derived from individual ones [9, p. 3]. More precisely, a society is nothing more than an arbitrary set of individuals that has no global properties. Every macro phenomenon that we aim at explaining is a result of the properties or actions of the individuals involved. Moreover, ontological or methodological individualism has normative implications, by stipulating that there are no such things as social values with an independent, irreducible nature. As a consequence, societies could be explained and construed in a modular fashion from individual processes. Systemic phenomena such as social cohesiveness, stability, or even global poverty, cannot be accounted for by individualism, because on such a view the only way to explain the emergence of processes with novel or unknown characteristics is to reduce them to individual facts and actions [7, p. 15]. Individualism is a reductionist framework insufficient in providing a satisfactory explanation of such complex issues as societal ones.

Within this ontological framework, a good society is only a matter of cumulative individual choices and responsibility, reducible to the good life of the individuals. The societal or political implications of the use of technologies are understood as consisting in the aggregation of their individual consequences or impact [5, p. 1]. Such approaches are typical of analytical applied ethics, which tackles types of cases that raise particular problems mostly for individuals, such as privacy, personal identity, security or cybercrime. But they are also implicit in postphenomenology [see 11,12]. For example, Verbeek's mediation theory gives an insightful analysis of the relation between individual users and specific artifacts, while ignoring social relations and the social ecology of which individuals are a part [12]. As a consequence, sociality, social values and social relations are not part of the "human-technology-world scheme" [5, p. 3]. Within individualism, questioning the impact of technologies on a societal level is, in a way, useless, because such a question would be in fact reducible to the individual level. A good society is nothing more than an aggregate of the properties of its members. And although some authors take into consideration the social realm and treat it as irreducible in some respects to the individual level, they nonetheless do not fully acknowledge the mutually shaping processes between individuals and the societies they are part of, as will become more clear from the following example.

Albert Borgmann, one of the most influential philosophers of technology, has never openly identified himself as an individualist. Despite this, one can find in his works tacit assumptions and presuppositions that pertain to individualism. Firstly, it is worth stressing that Borgmann contributed to the empirical turn in the philosophy of technology, by refusing to see it as a unitary, monolithic force. As such, his focus was always on concrete technological artifacts and their specific impacts on individuals' ways of living. Borgmann's endeavor of defining the 'device paradigm' has as its ultimate aim the illumination of how technologies affect and alter the life of users and the way they engage the world [38]. The disburdening character of technologies has an ironic outcome: it makes users lose engagement with the world. Borgmann proposes engagement centered around 'focal things' as a solution to a life of mindless consumption induced by technology [37, p. 30]. His ultimate quest is to urge us to set up our technologies so as to accommodate and foster practices of engagement, where engagement is understood as "a flexible and inclusive principle of ordering one's life" [38, p. 214] and it presupposes active involvement with the world and others. But Borgmann's proposal for such reform remains centered around the private realm, addressing individuals and their attempts at construing ways of engaged living [37, p. 30]. Although he stresses the need for developing certain types of civic virtues and behaviors that would contribute to the strengthening of technological communities – like politeness, sociability and civility [38, p. 233] – his attempts are ambiguous and far too abstract to provide concrete design procedures. Approaches such as Borgmann's are illuminating when aiming to address concrete problems raised by particular artifacts which unfold within a foreseeable time-frame and involve concrete stakeholders.

Individualist ontological, methodological or moral frameworks lack the strength for addressing collective action and values that contribute in significant ways to how individuals conceive good societies. Conceptualizing societies as sets of arbitrary individuals [7, p. 18], thus restricting analyses of their impact at a micro-level, entails the denial of social relations and social values. Every potential issue or problem posed by the uses of the new technologies is reduced to individual responsibility. There are no emergent properties resulting from the interplay between individuals,

[1] For a recent discussion of the ethics of unmanned combat vehicles (set in the context of debates about sex robots), see Ref. [39]. For a discussion on responsibility, see Ref. [4].

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communities and technologies, consequently there are no systemic social problems that must be addressed. But it is more and more clear that it would be impossible and even absurd to hold each and every individual user responsible for global digital phenomena like social polarization, the spread of extremism or fake news,[2] which start affecting our societies in deep and fundamental ways. So individualism is successful in answering very specific problems, but it fails when it needs to tackle emergent processes to whose existence technology contributes to a large extent.

By contrast, holism understands societies as totalities that transcend their members, irreducible to the properties of individuals. Social change brought about by the new technologies is conceived as supra-individual although it still affects the members of the concerned community [7, p. 16]. As such, technology, in turn, is a monolithic unit that acts upon another such unit, society or the environment [see 14,15,16]. In this view, social facts have an autonomous existence; they are necessary and sufficient for explaining individual processes. The main defect of ontological holism is that it "plays down or even enslaves individual action" [8, p.156]. What Bunge finds as the definitive shortcoming in holistic thinking is that it ignores the fact that social relations depend on the individuals that coalesce into a society or, in other words, that "all systemic properties are rooted in the properties of individuals and their interactions – to the point that they cease to exist when the individuals themselves become extinct." [7, p. 20]. In a holistic view, a society would have a structural property, inflexible and blind to the needs of the individual.

One paradigmatic case of a holist view of technology is to be found in Hans Jonas's works. Jonas sees technology as a "monolithic colossus" [37, p. 28], a unitary, intractable phenomenon that "has introduced actions of such novel scale, objects and consequences that the framework of former ethics can no longer contain them." [34, p. 6]. What provoked Jonas to devise a new ethics of technology based on responsibility is precisely his dissatisfaction with traditional moral systems which were anchored in ontological and methodological individualism, frameworks he considered to be inadequate for addressing the pressing need of dealing with the radical global threats posed by technology as a whole. Technology "advances by its own laws of motion" [35] engendering not only the environment, but also humanity because "[…] the apocalyptic potential of our technology is concentrated in the atom bomb" [34, p. 202]. While it is clear that nuclear weapons have the possibility of destroying the world, it is less obvious that the same caution mandated in the use of nuclear devices would also be advisable for other types of technologies. Jonas analyzes technology as a substantive entity, thus approaching the technological realm in a transcendentalist manner. This means, more precisely, that he is not interested in specific features or characteristics of technologies or their impact on various areas of individuals' lives, but actively looks for and attempts to identify the conditions of its possibility.

Most holistic approaches to technology belong to what Mitcham called 'humanities philosophy of technology'[3] [36] or to Verbeek's 'classical philosophy of technology' [12, p. 4]. These views rest on the fundamental distinction between the non-technical and the technical and assume that the technological realm might end up "alienating human beings from themselves and from reality" [12, p. 4]. As such, holist thinkers are most of the times emphasizing the negative consequences of the impact of technology on society and culture, although technology is not always seen as a direct cause of these adverse consequences. The shortcomings of holism in technological thinking refer directly to the fact that such analyses overlook the fact that technology contains many branches and applications that affect and serve individuals in a plurality of ways. Technology is seen as a too abstract a phenomenon, an interpretation that overlooks the particularities and differences between various types of technologies which give rise to specific patterns of thought and behavior in human life.

Individualism and holism are inadequate frameworks for analyzing the whole panoply of consequences that the new technologies have on an individual as well as a societal level. Individualism ignores the fact that societies are more than the sum of their citizens and cannot give an account of social cohesiveness and stability. Such phenomena are denied their status and are reduced to the micro level processes, more precisely to the individual ones. Consequently, technologies are analyzed only in relation to individual users and their societal consequences are treated as simple aggregates. On the other hand, holism conceives society as a trans-individual entity with irreducible properties to micro-level phenomena. In such a view, individual processes are ignored when they cannot be extrapolated from the macro level. Technologies are thus regarded as an entity with global properties, regardless of their field of application or their function.

These classic ontological frameworks have infused sociological and philosophical thinking through the long-standing debate concerning agency vs. structure. While individualism puts an emphasis on agency, reducing structure to individual-level phenomena or even ignoring it altogether, holism focuses mainly on structure ignoring the particularities or effective powers of agency. The drawbacks of individualism and holism can be overcome by advancing systemism in the attempt to understand the relation between technology and the good society in our current technological age.

3. A systems view of society

In a systemic framework, everything is either a system or the component of a system. The upshot of the theory is that it recognizes and allows the possibility of emergent properties characterizing the whole, which are not to be found in the components. Societies, in such a view, are neither simple aggregates of individuals nor supra-individual entities that transcend their members. They are systems of interconnected individuals. This allows the possibility for both resultant or emergent properties that are rooted in the interplay between individuals but cannot always be reduced to them [7, p. 17]. Bunge stresses the fact that a system cannot be defined only by a set of elements and their relations. We would also need, in order to define a system *s*, to know something about its composites (a nonempty set [C] of concrete members that populate the structure), environment (a nonempty collection [E] of discrete things which are acted on or acted upon by the composites), structure (understood as a set of relations [S] between members of C and E), and finally, but most importantly, mechanism, which represents all the processes [M] that sustain the system *s* [18]. As such, a system *s* is:

$$\mu(s) = [C(s), E(s), S(s), M(s)]$$

A society is thus a concrete system of a specific kind, although this should not mean that it is a living entity; it is supra-organic and non-psychological. It is made up of subsystems, such as the kinship, cultural, economic, political and technological ones, connected by feedback links, which in their turn are composed of individuals [17, p. 242]. Furthermore, these subsystems could be further divided

[2] While not in themselves new phenomena, their extent, dissemination and effects have greatly expanded through the Internet.

[3] Mitcham includes Martin Heidegger, Lewis Mumford and Ortega y Gasset within this tradition which has at its core the principle of the primacy of the humanities over technologies [36, p. 39].

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into socio-systems understood as even smaller aggregates of individuals, belonging to at least one of the subsystems mentioned above. They are all interrelated and in order for one to develop and prosper all the other ones have to go through the same processes of development. As such, social change takes place in the social structure of the concerned community, which affects both the individual and the societal levels [17, p. 235].

Systemism has the benefit of incorporating both feed-foreword and feed-back loops between the macro-level phenomena and the micro-level ones. Individuals are seen as elements of a system, which allows the emergence of novel characteristics or properties of the system that cannot be found at the individual level [9, p. 5]. This means that the two aforementioned levels interact with each other in a circle: the macro-level structures emerge from the individual level and, in turn, the individual level is shaped by the macro system.

3.1. The internal and external dynamic of the internet

In a systemic view, technology is a subsystem of the society that is shaped by it. But a subsystem such as the technological one also influences society at the macro level. The main advantage of systemism lies in the fact that it acknowledges that a subsystem such as the technological one has an impact at the macro-level. There is an interdependence between technologies and society which involves “mutually shaping processes and actions” [9, p.10].

How should we understand the Internet according to this framework? Besides being a network of networks that works on a common set of rules, standards and protocols, the Internet is also a space animated by the individuals who connect through it. As such, categorizing the Internet in strictly technological terms does not help to elucidate its nature. If one would imagine the Internet without human beings to populate it, one would immediately recognize that it would no longer be the disruptive technology that it is today. Power, authority and ownership are just some of the concepts that have been re-signified as they gained new applications and uses through the affordances that the Internet has created. This is due to the fact that this medium/technology lowered barriers of entry into political and business life, by granting an increasing number of people the opportunity to voice their dissatisfactions, to coordinate against traditional elites and to create alternate business models. The Arab Spring, Wikileaks or Anonymous are just some of the movements made possible by the Internet that changed the face of politics, of political involvement and participation. The disruptive power of the Internet and the politics of disruption made possible by it are actually the results of the interconnection between human agents. One must admit the primacy of individual action and inter-action in the attempt of clarifying the nature of this technology. But we should also keep in mind that just like any other technology, the Internet affords some specific patterns of thought and action, while foreclosing or concealing others (a topic further developed in section 4.2).

Human beings are the driving force behind this technology, whether they are improving, maintaining, inventing, destroying, restoring, repairing it or are simply utilizing and interacting through it. Internet users have formed a variety of communities which coalesced around different interests, giving birth to new applications and utilizations of this technology which created new business models and formed new types of political organizations imagining innovative manners of political participation. All these phenomena shed light on the internal self-organizational dynamic of the Internet [9, p. 13] as a subsystem belonging to the bigger societal system. As such, the Internet cannot be strictly defined nor understood in strictly technical terms.

But there is another layer that could be added which results from the interaction of this subsystem with the bigger societal system [9]. According to Mario Bunge's systemic view of society, the unity that we aim to analyze, society, is, in fact, a complex one, that admits multiple subsystems with their internal dynamics, laws and processes [18,1]. The Internet constitutes itself in such a subsystem, belonging to the techno-sphere or the technological infrastructure of society [9, p. 12]. In a systemic view the whole and the part interact in ways that are not strictly deterministic.

The relationship of technology as a subsystem to society as a whole is a complex, non-uniform and non-linear one, due to the fact the interaction between the micro and the macro level comports self-organizational characteristics which are emergent and cannot be easily predicted with reference to the other level. All the processes that shape and form the techno-sphere come from the outside, from the socio-sphere, but in its turn, the socio-sphere is influenced or informed by the technological sphere. For example, it is extremely hard to tell if social media platforms influence individuals in a very clear and concise way or if individuals shape and direct social media use in specific patterns of use. Was the Arab Spring caused by social media platforms or was it a social phenomenon that would have happened, maybe in a different way, even without social media? It is clear that the answer to such a question cannot establish a clear causal link because the technical and social realms are deeply entangled, given their bottom-up and top-down determinations [9, p. 15].

The Internet is thus an inherently social phenomenon, with its own internal dynamic and, at the same time, a subsystem of society. This claim sheds light on the relationship of technology to society by pointing out that looking for linear causal links is misleading. This relationship is rather shaped by means of “complex, non-linear circular causality” [9, p. 15]. A particular technology, or in our case, the Internet, will have multiple, irregular, unpredictable and contradicting social consequences which are, of course, informed by certain characteristics or properties belonging to the social realm.

At a first view this kind of conceptual movement doesn't seem to have too much explanatory power, as it might look like just another way of trying to conceal, in a sophisticated form, what we do not really understand. Systemism could guide us in the attempt of designing the Internet so that it accommodates a variety of individual and social needs and values. In the following section I will introduce Ivan Illich as a systemist thinker who acknowledged that the way we design technologies has a profound impact on a societal level and could actualize a good society. A good society, in his view, is one dominated by conviviality. Conviviality admits a deep interconnection between the use of technologies by individual users and the properties of a good society.

4. Ivan Illich, a systemist without knowing it

Ivan Illich is one of the many social thinkers who recognized the importance of analyzing the extent to which technology design affects the project of a good society [19]. What distinguishes his work from other attempts to identify how technology could foster a good society is his systemic understanding of social structures. The implications of technologies warrant serious investigation because they have a profound impact not only at the level of individual processes but also at a societal level. For Illich there is a clear connection between upper level properties (the values of a good society) and micro-level facts (how technologies are created and used).

The main scope of Ivan Illich's work was to show that people, despite their differences and similarities, can live together, in conviviality, in complex systems such as societies. Communities, after all, have systemic properties that cannot be reduced to individual ones, conviviality being one of them. Conviviality takes into

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account both individual agency and social structure, being "the autonomous and creative intercourse among persons and the intercourse of persons with their environment" [19, p. 24]. The power of conviviality, as an inherent ethical value as well as a design criterion, is that it does not envelop the individual, transforming her into a simple component of a larger entity. Nor does it deny the existence of such an entity with specific properties, namely society. In fact, conviviality as a global property results from the interaction between individuals, their environment and technology. Only this type of ontological framework acknowledges that "technology, which is itself shaped by society, actively shapes society by influencing the way in which people behave, the way in which social roles, relations and institutions are constructed, and the manner in which culture manifests itself" [24]. Illich realized that it is extremely important for individuals to exercise their freedom and creative capabilities, in order for the community as a whole to flourish. So conviviality considers the relationship between individuals, but also between individuals and their environment as well as their technology. It is an abstract quality of societies as opposed to more concrete ones, such as prosperity and equality of opportunity. Abstract qualities are more fundamental because they admit different satisfaction conditions [24]. More precisely, they accommodate the space necessary for individuals and communities to build upon their specific ideas of flourishing lifeworlds.

4.1. Manipulative tools and counterproductivity vs. convivial technologies

The value of conviviality is technologically enacted by what Illich calls 'convivial tools'[4] [19]. In a further refinement of his definition, Illich argues that conviviality refers to "a society in which modern technologies serve politically interrelated individuals rather than managers" [19, p. xxiv]. Technologies play an important part in either fostering "autonomous and creative intercourse among persons" and "self-realization" [19, p. 24] or in "extinguishing the free use of the natural abilities of society's members" [19, p.11]. The former category corresponds to what Illich calls convivial tools and the latter to manipulative ones [20].

Conviviality can be brought about when people can master their tools instead of blindly and uncritically accepting and using them. Illich stresses that "people need new tools to work with rather than tools that work for them" [19, p. 22], more precisely they need tools that offer them the ability to work independently and with high efficiency and which augment each person's freedom, rather than instruments offering products or services that are taken as such. Illich's fear was that we may be serving tools, instead of having tools that serve us. Modern technologies, after a certain threshold, start creating the needs they purport to satisfy. In other words, manipulative tools define and shape user's needs, diminishing their autonomy and freedom.[5] Even though tools, when actively mastered, can empower individuals by enhancing their relating to themselves and to society, they could equally "determine [the user's] self-image" when "he is passively acted upon" by them [19, p. 21]. This happens when technologies become counterproductive, when they acquire a self-serving character.

Counterproductivity refers precisely to the phenomenon where technologies end up subverting their initial aims. Illich offers the example of cars as a paradigmatic example of counterproductive technologies. While cars (irrespective of the brand) were built for making transportation more fast and efficient, when their number expanded they ended up undermining their own effectiveness. If one were to calculate the time spent in traffic jams, the costs of producing and tending to a car, the resources spent on fuel, and the pollution cars cause, it would be evident that walking or cycling would be more cost-efficient and environmental-friendly means of transportation [19, p. 66]. Also, some persuasive technologies - intentionally created for the purpose of changing people's attitudes or behaviors [10] - are good examples of counterproductive design, because they distract users' attention, manipulate and even remove one of autonomy's necessary conditions, the possibility of decision [28]. Think of the social media platform Facebook which manages to capture users' attention by exploiting non-rational desires, biases and impulses through the use of persuasive design [40]. Facebook started off as a company that had as a mission the global connection of people as a means to empower them. But, in the end, it proved to be one of the most distracting mediums, contributing to channeling users' attention towards goals that were not necessarily chosen by them. So instead of creating a global community, Facebook managed to 'lock' users into echo chambers or filter bubbles [3], undermining social cohesion and also personal autonomy or freedom. While its short-term impact is that of distracting users from their immediate tasks, the long-term consequences might be that of undermining users' capacities of intentionally choosing how to shape themselves and their lives and, implicitly, the societies they are part of.

Illich wasn't skeptical about technology, he was just trying to affirm the need for a critical appraisal of the tools we use, in order to avoid what he called the "enslavement of man by machines" [19]. He was not thinking about dystopian scenarios, but about concrete and daily life possibilities: people become dependent on the technologies they use, they blindly trust them and let themselves be led by them. The consequence of uncritically accepting technologies is falling into the trap of the 'rhetoric of mechanical objectivity' [21]. This means, more specifically, equating everything that is automated with neutrality and objectivity, thus eluding the mediating character of new technologies. Convivial tools, on the other hand, would both improve the conditions of possibility for individual freedom as well as the quality of human relations and the collectivity as a whole. Illich perfectly summarizes this point [19, p. 34]:

> Tools are intrinsic to social relationships. An individual relates himself in action to his society through the use of tools that he actively masters, or by which he is actively acted upon. To the degree that he can master his tools, he can invest the world with his meaning; to the degree that he is mastered by his tools, the shape of the tool determines his own self-image. Convivial tools are those which gives each person who uses them the greatest opportunity to enrich the environment with the fruits of his or her vision. Industrial tools deny this possibility to those who use them and they allow their designers to determine the meaning and expectations of others.

Unlike counterproductive or manipulative tools which appear through mass production and certified, professional expertise, convivial tools guide people towards self-reliance and autonomy. As such, technologies are not value neutral, they have profound

[4] Tools are understood as the category of all rationally devised devices [19, p. 34], thus a tool is any explicitly articulated rational structure, be it material or cultural [22, p. 23]. I will here use the term tool and technology interchangeably, as umbrella terms for all the panoply of applications that run on the Internet.

[5] Counterproductivity echoes recent concerns regarding persuasive design. Persuasive design is an umbrella-term for all web-based applications meant to stimulate, influence or change users' attitudes or behaviors and it is often associated with extreme social polarization and atomization (see, for example [25] [26] [27]). Although persuasive design is not inherently bad, ethical questions still abound. In some cases, persuasive design might have unknown and, implicitly, undesirable consequences on the user's well-being, like cannibalizing user's time and attention, inducing morally unjustified actions and, last but not least, overriding its autonomy (see, for more details [28]).

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consequences both on the user and on society. But, in the same time, a convivial society is one which acts upon the tools that populates it, by re-appropriating them for specific purposes or needs.

4.2. Second-order agency of tools

The analysis of technology as convivial tools has important implications for a very controversial issue, namely the agency of artifacts. Illich adopts a pragmatic approach, situated between two extremes: conferring tools primary agency, of the kind that human beings possess, and denying them any kind of agency, a view pertaining to an instrumental and functional interpretation of artifacts [23, p. 17]. Technologies thus have a secondary agency, which is acquired through the designer or creator's distributed agency, allowing the concerned tool to act upon users without a direct influence. In other words, second-order agency is delegated agency. How is then this secondary agency acquired? The tools populating the lives of human beings do not, by themselves, have an inner life and thus their agency is much weaker than the one usually ascribed to individuals. Because of his systemic view of society, Illich admits that the techno-sphere is acted upon or transformed by users as much as it acts upon or transforms individual and communal lives, but he restrains his analysis solely on the structure of tools and how they should be shaped in order to foster conviviality. Thus he eschews discussing the user's intentions. The reason for this is that artifacts, in the context of mass-produced technologies that require professional expertise and supervision, cannot but constitute themselves in closed systems, unknowable to users and thus manifesting their influence on user behavior and attitudes in a tacit and subliminal manner.

As such, technologies are not simple instruments but mediators, they implicitly or explicitly shape the way people construe their lives and the world around them, by influencing the relationships between users and their environment. In other words, “This mediating role is made possible by the specific ways in which technologies in use are present to their users: such technologies are not the terminus of human perception and action, but rather withdraw from our attention, making possible specific experiences and practices” [10, p. 3]. This means that both designers and users have the power to shape or invest a certain identity in the technologies they use. But unlike classic mediation theories (see, for example [12] and [27]) Illich points to the fact that in reality things are more complex. Outside theories, in the context of hyper-industrialized and a technologized world, users are situated differently with regard to the control they have on technologies. Moreover they possess unequal degrees of power and levels of awareness or knowledge regarding them. Most often, designers (or managers) are those who create the mediating roles of technologies, through delegated agency that is distributed from designers to the technologies created. As such, technologies should embed ethical values which foster not only the good life of the individual, but also the good of the community as a whole.

5. Values for conviviality

As argued in section 3, systemism overcomes the shortcomings of individualism and holism, by admitting the mutual shaping processes between individual users, communities and technologies. But, at the same time, systemism makes difficult the task of finding design criteria for technologies because it denies the existence of clear causal links between technology seen as a subsystem and the bigger system of society. For this reason I will turn to Ivan Illich's insight about the role of technologies for conviviality. Conviviality, as a systemic understanding of a good society, has the benefit of encompassing both the individual and the societal level in the attempt of understanding the role of technologies. The aim of this section is to develop design criteria in light of conceiving technology as convivial tools in a good society. Beforehand, I will make explicit the values implicit in the concept of conviviality.

Ivan Illich sets out to identify the values – both individual and societal – that need to be deployed in technology design for the concretion of a good, convivial society. He identifies two axiological pillars: personal autonomy and the empowerment of social cohesion. Although it is beyond Illich's scope to offer precise design criteria or guidelines that could be followed to create convivial tools – which is a task that will be undertaken in the following section – he still suggests three conditions: convivial tools require learning by doing, they serve the user and its purposes, and they or the work resulting from the interaction with them can be easily shared with others [19 p. 35].

These three conditions can be condensed in the value of personal autonomy. Illich stresses the importance of autonomy in the use of tools and technologies. This autonomy would be hampered if the way in which people use tools would be determined by engineers, designers, managers or any other kind of external professional [29]. Conviviality puts an emphasis on the need of considering personal autonomy in the process of designing any kind of tools. But by conviviality Illich also wanted to make explicit the implication of community decision-making in design [19], for the purposes of enhancing social cohesion. Although many are skeptical about the outcomes of implicating the community of non-experts into any kind of technical or expert decision making,[6] Illich believes that insofar as experts decide for the citizens, the latter cease to function as an active force in society. Social cohesion and public participation would also promote better decision making because not all knowledge is technical. Moreover, indigenous knowledge could inform expert decision making with regard to what really matters for the concerned public. The social dimension is important in technological design because people have a right to contribute to the decision that will affect them [29, p. 304].

Convivial tools, therefore, not only foster human freedom, but also inter-connectedness between individuals, more precisely they emphasize the benefits of community. They also encourage creativity, as they are not controlled by any institution or organization.

5.1. An ethical design matrix for conviviality

Individual freedom and the empowerment of social cohesion will serve as the main axiological points of reference for the identification of the concrete criteria that could guide designers in building into the technologies they create a special form of mediation that encourages and fosters the conviviality which characterizes good societies. This matrix for designing for conviviality moves beyond the strictly individualistic approach of prescribing a “morality of artifacts and their mediating role” [5, p. 3] by incorporating the social dimension of technological mediation.

A matrix for ethical design is necessary because technologies are not simple functional tools but mediators in the representation of reality. Theoretically these forms of mediation could be determined by both designers and users. But in order for users to re-appropriate the technologies they use, these have to be flexible, so that individual users could re-shape them in accordance with their own projects. As such, designing becomes an inherent moral activity

[6] User-friendly and user-centered design are two proposals that offer extensive attention to users (see, for example [31] [32] [33]). But, most of the times, these approaches are individualistic, because of their focus on the particular desires and needs of individual end-users.

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[27]. Designers could thus explicitly build in specific forms of mediation, like ones that could foster conviviality. In order to avoid top-down approaches to technology design, it is crucial to embedded values that are versatile enough so as to accommodate a variety of uses or identities.

Conviviality is such an affordance that could be built into technologies, especially because it has in view individual as well as social values. Moreover, conviviality as a systemic view of society offers the conceptual framework for shifting from a cumulative perspective of a good society – characteristic to most individualistic approaches – towards a more communitarian outlook. During technological design, this shift will enable certain types of behaviors, which are desirable for a good society.

The concrete design procedures that should be followed in order to build convivial tools are derived from the two axiological pillars identified by Ivan Illich, namely personal autonomy and social cohesion. To respect and enhance individual autonomy in using technologies, I suggest the following minimal design criteria:

a. Flexibility – one should be free to use a program as they wish, for any purpose that is defined solely by them. The user should be able to re-signify the application or software for purposes other than the ones that were defined by the designer. A technology should not constrain the user, nor should it deny certain possibilities.
b. Transparency – one should be free to know how the program works. Access to source-code is not a necessary requirement, because direct availability of source code is not the main concern. What matters most is the possibility to investigate how it works in case something goes wrong. This criterion fosters an "knowledge ethics" that would enrich the user by avoiding transforming her into a passive consumer. Users should be active participants in their interaction with the technology used. A "knowledge ethics" is opposed to a "mind-your-own-business ethics" [30].
c. Simplifiabilty and usability – the user should be able to discover how technologies can be best used, without depending on expert guidance. One should also be free not only to improve, but also to simplify the program/technology. Complicated artifacts clog not just the user's screen, but also her life [29, p. 308]. For example, clogged software or applications that do not offer the possibility of choosing only the features the user will employ, tend be frustrating. This is due to the fact that more often than not, icons or context sensitive help notes distract rather than help the user focus on her task.

The criteria for the other axiological axis, social cohesion are:

a. Sharedness – one should be free to share the technology or the results of the technology with anyone they see fit. This would also imply the freedom to improve certain technologies and to make those improvements available to everyone. Sharing is extremely important especially for information and communication technologies. Although such a design criterion could entail a certain amount of danger (misinformation could be more easily spread and sensitive information might get into the hands of not so trustworthy individuals), it would also allow for people of all social and financial statuses to have access to information. The fact that nobody is excluded from access to knowledge or information can contribute to social cohesion.
b. Creativity – one should be able to tinker/hack/remix a technology and present it for the others. This would allow users to enrich the environment with the fruits of their vision and would also avoid the danger of transforming users into passive consumers that take at face value what is being offered to them. Technologies should contribute something to the individual's life, besides the punctual or specific purposes for which they were created. This could be accomplished only if the user can learn something from the use of the concerned technology and can later use that knowledge in order to contribute to or improve life in community.
c. Sociality – designers should not only take into consideration the good of the individual (her pleasure or satisfaction) but should also acknowledge that a good society is one in which people are able to communicate with each other in a simple, intuitive and accessible way. As such, designers should avoid using persuasive design, meant to influence the behavior and attitudes of users, for the purpose of entrapping them in the technologies they utilize. Sociality in technological design might imply that in certain cases, the individual's preferences and immediate satisfaction will be trumped by the needs of the community.

Indeed, it would be impossible for every technology to be convivial. Nevertheless, what designers and users should take into account is that there must be an equilibrium between convivial and non-convivial technologies. In other words, "What is fundamental to a convivial society is not the total absence of manipulative institutions and addictive goods and services, but a balance between those tools which create the specific demands they are specialized to satisfy and those complementary, enabling tools which foster self-realization" [19, p. 37]. This is neither a proposal for regulation, nor an absolutist statement about technologies in general, but rather a heuristic guide for those designers that feel they have a social and moral responsibility towards the users of the technologies they create.

Some of these values are already fostered by the FLOSS (free/libre open source software) movement [29], which could be said to offer paradigmatic examples of convivial technologies. What makes FLOSS convivial is not necessarily direct access to source code, which most users are not interested in due to a lack of specialized technical knowledge and skill. Free/libre open-source software is convivial because it is centered around the values of openness and free expression, while putting an emphasis on users' ability to understand how the artifact works by relying on a community of programmers, testers, translators and other digital enthusiasts. FLOSS fosters the values of cooperation and social cohesion, due to its being operated by a group which provides explanations and help on special forums and sites for users with less technical skill. This organizational structure removes the dangers of centralized expert technical knowledge, by allowing users the freedom to inspect, directly (through access to source code) or indirectly (by asking for the community's input), the inner workings of the respective app or software. Another convivial characteristic of FLOSS is that it is free, not in the sense that it does not ask for money, but in that it allows the users to do as they wish with the artifact, even to share it with others. All this feedback process, although sometimes difficult, fosters the autonomy of individuals who instead of getting their problem solved in an indirect manner are taught how to understand, use, manage or repair the artifact in question. But it also encourages users to communicate with others, to establish professional or personal relationships and to ultimately place trust not in impersonal mechanisms of feedback and management, but in individuals coalescing around a core set of beliefs about technological design.

The design criteria proposed in this section can be seen as suggestions to be followed in the attempt of creating convivial technologies that could contribute to the creation of good societies. The advantage of this matrix is that it focuses on both local, individual benefits, as well as on global, societal conveniences. Convivial technologies empower the user by allowing her to

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understand how the technology works, processes personal data and ultimately impacts her life. This opens the way not only for the possibility of understanding software and applications, but also for modifying them so as to accommodate immediate purposes and goals. Openness in technological design is important not only for accountability purposes, but also for fostering creativity, which is a prerequisite of a good society in which technology does not 'lock in' individuals, transforming them into passive consumers or receivers of content. Sharing the fruits of one's technological labor is also an important aspect of a good society, as members of a community are more knowledgeable of what that particular society actually needs in terms of technological artifacts. But for these characteristics to be embedded into the process of creation of technologies, designers should sometimes put the good of a community before the immediate temptation of satisfying individuals' desires and needs. For example, those unconvivial technologies which employ predictive analytics so as to offer each individual content matching their interests and preferences have as a consequence the insulation of users from different perspectives and lifeworlds. And although consumer satisfaction is guaranteed, the downside is that this method isolates people from those with opposing views, reducing possibilities of rational deliberation and agreement.

6. Conclusions

At its initial stages the Internet was seen as a technology and hypermedia specifically created for shared learning and critical interpersonal engagement. Gradually, this view turned upon itself. The Internet, and all the new technologies, are not only simple functional tools, but they influence or shape the ways we see ourselves and interact with others [2]. Technologies which serve strictly the user's preferences [24], made way for detrimental phenomena such as 'filter bubbles' which entrap users and fragments communities [3]. It is often assumed that instead of contributing to social cohesion, these technologies end up frustrating the purposes for which they were created, isolating people from each other by undermining the social texture they are part of and by promoting social polarization [3]. This is because designers have focused mainly on offering users solely what they like to see or experience [24]. In other words, the Internet did not coalesce into alternative infrastructures for devising social arrangement meant to better not only particular aspects of individual's life, but life in society as a whole. Our digital lives did not converge into Marshall McLuhan's 'global village', but rather in a cluster of fragmented, polarized and self-centered digital tribes.

There is a pressing need to find new ways of addressing the negative effects of new technologies on an individual as well as a social level. But such an endeavor might require a clarification of the assumptions regarding the interplay between individuals, societies and technologies. In section 2, I stressed the shortcomings of the two most common ontological frameworks that inform thinking about technology and the role it plays into actualizing good societies. While individualism ignores the importance or even existence of social values, thus focusing on individual users and their relations to technology, holism treats technology as a unitary, monolithic force acting upon society, thus ignoring individual agents. In section 3 I argued that systemism remedies such deficiencies by advancing a complex, non-uniform and non-linear account about the relationship between technology and society. Conviviality as a systemic property of good societies (see section 4.1), assumes a connection between the micro level (corresponding to the individual) and the macro level (society as a whole) and the existence of both feed-foreword and feed-back loops between the two. On this view, technology is not in a strict, deterministic relation with the individual, nor is it understood as having an essence that impacts society as a unitary force. By contrast, according to the systemic outlook, technology affects society, which in turn affects technology. This means that there are no strict causal links between the two, and that technology could have multiple, non-linear consequences on a societal level, but which are influenced in various ways by the characteristics of individual interrelations.

In the attempt of building technologies for a good society one should avoid looking for strict causation links, as these would lead to neglecting the complex interplay between individuals, technologies and society. A more adequate approach would be to assume a panoply of consequences, predictable and unpredictable, that arise out of these mutual shaping relations. One should have in view both individual agency and social structure. Conviviality accounts for both these levels. Drawing on Illich's analysis of convivial tools, I suggested concrete design criteria that should be followed in the attempt of building technologies that better the community as a whole and, implicitly, the life of the individuals composing it.

The design criteria advanced in section 5.1 merge around two main axiological pillars, individual autonomy and social cohesion. In order for the autonomy of the user to be respected or even enhanced, minimal criteria like flexibility, transparency and simplifiability/usability are demanded. These would guarantee that the concerned technology is not controlled by a specific company or obscure community of experts. The user would be free to understand how the technology works, to use the program as she wishes, for any purposes defined by her and to eliminate the features that clog or complicate her life. At the same time, it is extremely important that designers see the users as they are, meaning not as distinct and delineated monads that demand their needs to be satisfied, but as social entities embedded in a certain social ecology. As such, the social fabric would be tightened through the use of the new technologies if users have the ability to enrich their world through use and to share the fruits of their labor with others. One answer to all counterproductive tendencies in technological design is conviviality. It allows the space necessary for individuals to build on communal understandings of what a good society is and would look like.

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