

# Bridging the GAP between product and user: Design of product-by-structures & design for prosumption

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## Abstract

The relationship between people and the objects is the determinant factor of the relationship between life and human experience. Human-object relationship since the last couple centuries has been organized predominantly under the influence of modern foundations such as production-consumption dichotomy or instrumental understanding of technology. Rational capitalist strategies, which became the economic standard in the same period, has ruptured this relationship in order to satisfy speed, efficiency and profit ambitions of capitalist companies by conspicuous consumption of mass produced products. In this relationship, the product is reduced to a mere consumption object, the human being to a mere consumer and they are put apart. Such separation of human and object is, in the context of this study, conceptualized as GAP. Aim of the present study is to reveal ways of bridging this GAP by proposing conceptual models as alternatives for fixed models of industrial design activity, i.e. finished product and user. Research data were obtained based on extensive literature reviews in the fields of design, engineering, arts, humanities and philosophy and applied design studio projects. In this paper, the conceptualization of the research background is presented through theoretical discussions. The research findings contribute directly and inclusively to the fields of design research, practice and education as the proposed model in the context of this research may provide more sustainable, indigenous and developable paths for design activity.

## Keywords

Open design, Phygitals, Product-by-structures, Prosumption, User competency.

## 1. Introduction

In the context of this research, separation of production and consumption subject to Cartesian dichotomies is under question. We argue that separation of production and consumption and positioning in opposite poles has caused also separation of producer and consumer identities, thus other depending values in economic and social cycle. Main argument of the study is that production/consumption dichotomy has ultimately created a 'GAP' between industrial design's two main subject: product and user. Since human being is positioned as a consumer (or user) and as far away from design, production and distribution processes as possible in conventional industrial design, user is intentionally considered as a subject that only encounters the results of processes. Modern industrial designer, immanently under influence of production/consumption dichotomy, designs off the shelf, finished products for a 'persona' conceptualized as someone who is unaware of what is going on at the background of processes and inside the product. Therefore, industrial designer principally designs for an alienated persona who accepts the outputs of these processes as the things-in-itself. Emergence of this human type, as it is widely discussed in sociological sphere for a long time, has created a radical transformation and a great impact in social domain by causing disengagement between knowledge and society.

According to Feenberg, when well designed, technologies allow for the coexistence and coordination of different worlds and enable people to disclose and to enact what singularizes an individual and differentiates that person from the others (Callon, 2010). If well designed, technologies would have been a barrier to the emergence of alienated, pacified consumer human being pushed to the passive pole of the production/consumption divide. Such conceptualization of technology calls for an ontological turn that asks what technology really means. Technology in modern world, is understood most commonly under influence of instrumentalist and anthropological defini-

tions that emphasize the nature of technology as a means-to-end and a mere human activity (Heidegger, 1977, 5). However, when approached from an ontological and etymological perspective, the very word 'technology' reveals its long-time concealed meaning. The Greek word τέχνη (techne) is the art and skill in making things. Accordingly, for that time, τέχνη is the work of a sculptor, a stonemason, a composer or an engineer. The suffix – λογία (-logia) stands for the study or lore of something. Therefore, the word of τεχνολογία (technology), in the most fundamental sense means knowledge of making things. This definition removes the instrumentalist emphasis on technology as it turns the argument to the process rather than the output. Secondly, the view that technology is not a mere human activity is rooted in the ontological perspective, in which technology is seen as a way of revealing, unconcealment of the concealed, therefore truth, *aletheia* (Heidegger, 1977, 12). Those seeking evidence that such revealing is not a mere human activity may look to a tree bearing fruit or simply any vital activity in nature.

We argue that one of the main perpetrator of GAP is the framework in which anthropological and instrumental definitions of technology predominates and forms the basis of technological understanding. Therefore, as an initial attempt to bridge the GAP, we point to the need of an alternative understanding of technology. Our first proposal to solidify this alternative understanding of technology is, by departing from ontological and etymological origins, is to term it as *techne-logos*. This terming will help us to differentiate our technological stance from long-established, rationalized, calculative, market-oriented technological understanding whose ultimate goal is to create a single common world by dangerously eliminating the authenticity and creativity that are inherent parts of our existence.

The main contribution of this study is towards emancipation of product and user – two main subject of industrial design – which we argue to be sealed under formal capitalism and the global socio-economic organization of life. In the following part, the concept of GAP,

rationale behind its emergence and consequences will be discussed. In the third part, we will introduce our methodological model that suggests ways of bridging the GAP.

## **2. Problem area: GAP as a natural outcome of production & consumption dichotomy**

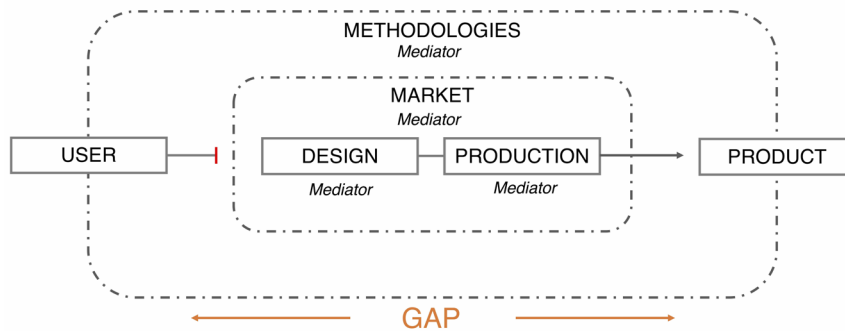
It is argued that, for the last 2-3 centuries, the organization of economic and social life has been under sway of Modernization and separation of production and consumption is the result of rational scientific thinking. Defining characteristic of Western modernity according to Weber is rationalization where calculation legitimizes a kind of control or mastery (Young, 2018). Therefore it is fair to argue that economic interests that are accounted by rationalist methods are predominantly determinant in comforting our actions in social and economic life.

Weber states that rationality is determinant of the formal property of all types of social and economic action as it presents a means-end relationship (Holton, 1983). He distinguishes four types of social action which represents the universal capacities of Homo Sapiens as affectual social action, traditional social action, value-rational social action and means-end-rational social action (Kalberg, 1980). He asserts that the former two are non-rational social actions while the latter two are rational actions. Besides, Weber (1958) proposes a fourfold typology of rationalism that consists of practical, theoretical, substantive and formal rationality. He states that, formal rationality unlike the intercivilizational and epoch-transcending nature of practical, theoretical and substantive rationality, belongs only to the sphere of industrialization. This suggests that industrial economy, throughout the last couple of centuries has adopted formal rationality as its methodological ground under the name of Rational Capitalism which is distinct from older types (Holton, 1983). We argue that, rational capitalism is defective as it perseveringly keeps production/consumption distinction on its agenda in the organization of social and economic life. The formal setting in rational capitalism

manifest itself in a dichotomous mode in which individuals or communities are conceptualized as either producers or consumers, positioned in the opposite poles (Campbell, 2005). In such an opposition, activities of production and consumption are separated from each other, denying the fact that production always and in all settings involves consumption and vice versa (Ritzer, 2016).

Such separation is considered predominantly as a result of modernization process of everyday life which are based on industrialization, growth of science, technology, modern nation state, capitalist world market, urbanization and other infrastructural elements. Modernization, from the point of view of certain thinkers such as Weber, Tönnies, Simmel has been contrasted to traditional order and its agenda towards progressive economic and administrative rationalization and differentiation of the social world has been put forward (Featherstone, 2007). For example, in regard to production, factory-based and automated machine production that eliminates the possibility of authentic, expressive and creative engagement of individuals into production processes (Wrench & Punyanunt-Carter, 2012) has been differentiated and rationalized instead of traditional type of production, craftwork, which is seen as more humane and liberating (Campbell, 2005).

Another apparent distinction can be observed in design and production processes. Craftsmanship, which is seen as the traditional manufacturing method, is a process in which design and construction are undertaken by the same person (Harrrod, 1999). Conversely, in industrial production, design and manufacturing processes are separated from each other and these processes are maintained by different professional expertise. Emergence of Industrial Design as a profession in its own right in the late 19th to the 20th century (Raizman, 2003) has led to this separation between design and production (Prestholt, 2014). Separation of design and production marks a critical break where holism fades away and the processes are compartmentalized in which neither designer nor maker assume total responsibility of processes from beginning to



**Figure 1.** The GAP in product - user relationship.

the end. It is commonly acknowledged that compartmentalization of focus in design-like activities causes failure to provide holistic or integrated solutions (Petrović & Perkins, 2016). Others argue that the approaches that rely on the decomposition and compartmentalization of a system to components and sub-systems, leads to a pattern of behaviors and regularities that are true of the system as a whole, but for which the sum of components fail to capture (Holland, 1999). Just as Dewey argued that when the senses are compartmentalized, “we undergo sensations as mechanical stimuli or as irritated stimulations, without having a sense of the reality that is in them and behind them” (Dewey, 1934, 21), compartmentalization of the design and production processes causes a sense of alienation among the ones who engage in processes or with outcomes<sup>1</sup>.

Another divisional separation under formal capitalism can be observed in economic theory where market and household economy are considered as opposing pairs (Ironmonger, 2000; Mueller, 1982). Traditional consumer economic theories consider the individual as consumer implying that household members are fundamentally consumers. According to Becker (1965), who introduce time as a scarce resource in consumption related decision making, time is divided in two categories as labor time and consumption time. In this categorization, consumer is seen either as worker outside the household or as consumer within the household. According to Kurien (1996, 13) economics, which many of its early proponents claimed to be the study of an important aspect of daily life, has become, almost completely detached from concrete economic problems and he explains the

reason of this fallacy as the tendency of logic and mathematics to create a universe of discourse of its own. He posits this tendency as a danger that an artificially created world based on logical reasoning and rationality is viewed as authentic. This artificial reality, which flourished in traditional economic theory, reduced the individual to either a worker in the market sector or a consumer who buys goods and services, and constrained human life to this simple dichotomy.

Those dichotomous modes summarized above have played a dominant role on a global scale in the organization of social and economic life for several centuries and constituted the basis for the regulation of product and user relations. As represented in Figure 1 the product and the user were pushed to opposite poles and were able to relate to each other through the market with the presence of mediators and only during use.

### 2.1. Finished product: Blackboxes

Dunne and Raby (2001), point to the finished product and coin the term ‘product genre’, which is the target output of the conventional design activity and they assert that design activity should be directed towards the paths that can produce alternatives to finished product. Product genre of ‘finished product’ emerged as a result of production/consumption separation mentioned in the previous section, with an approximate history of 2-3 centuries. Finished products mean the final packaged product intended for human consumption (AGLC, 2020). According to another definition, finished product means a licensed product in the field in its finished, labeled and packaged form,

ready for sale to the market or use (Law Insider, 2006). Others defined finished product as any licensed product that has been formatted for use by an end user and that does not allow further manipulation or conversion (Lennon, 2021). Finished products according to Slater (1997a) are standardized and aesthetically uninspiring, many of which actually are not needed and few of them are capable of bringing any real or lasting satisfaction to its users / consumers. Finished products are the fundamental tools of consumerist culture and capitalist economy. As a matter of fact, modern economy has been built on the notion of finished products to increase the consumption of societies at a global level. These specifications of finished product emphasize the limitations of the end users to a certain extent in their interaction with products.

Finished products are 'finished' not only in the sense they are produced and distributed as an artefact, but also because they are designed to expire. The death of a finished product is planned way before it is manufactured and distributed. Ink jet printers going either to landfills or recycling long before their capability of printing vanishes are good examples of such obituaries<sup>2</sup>. The expiration date of a printer is usually determined according to the prices of new cartridges which are usually close to buying a new printer. Smart phones, tablets or laptop computers that are the most dominant consumer electronics products of our age provide similar examples to maintain this cycle of consumption. Such electronic devices receive software updates periodically. New features proposed in time often put a relatively higher load on the device's hardware and offered improved user experience often comes with a worsen product functionality. Either the battery life or product performance is reduced, or the software becomes unusable after the update. As in the case of the cartridge, users often feel encouraged to buy a new smartphone instead of replacing the battery as the prices of the batteries, service subscription or signed contracts are kept high (Thiébaud et al., 2018; Wilson et al., 2017). Another fact that lead users to replacement is

due to feelings of low cost of replacement versus expensive and laborious repair (Ylä-Mella et al., 2022). One may see this cycle irrational, although all the decisions throughout the process is performed rationally. Apparently, the rationality takes place is to sustain the business plans of the companies that substantially rely on speed, efficiency and profitability.

Whether these cases are the result of planned or perceived obsolescence, or strategies to ensure the balance of supply and demand, or to achieve a kind of development in which providing employment at a global scale; it is obvious that economic strategies rely on finished products contain problematics from the perspective of ethics, respect, courtesy, honesty or environmental issues (Giaretta, 2005; Guiltinan, 2009; Malinauskaite & Erdem, 2021). The life of a finished product is measured within the interests of the global economy and is considered 'alive' as long as it provides a profit<sup>3</sup>.

Such positioning of the products has been proved to be wrong for the natural sources (earth), for the living things and also for the things itself. The untimely death of the product means all the effort put into making is wasted, and a flock of unfulfilled entities turned into a garbage heap. It is clear that this is not a sustainable approach in any way, including the economics. One of the most important factor necessitating the global adoption of sustainability goals is the finished, closed, linear product genre, which Latour refers to as 'blackboxes'. Blackboxing, to cite Bruno Latour is "the way scientific and technical work is made invisible by its own success. When a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity. Thus, paradoxically, the more science and technology succeed, the more opaque and obscure they become" (Latour, 1999). 'Black boxing' means treating social objects as finalized entities with fixed boundaries that cut them off cleanly from other objects and social processes on their outside and that endow them with a taken-for-granted 'inside' that is assumed to account for their shape and stability (Slater, 2018). Callon (1999) identifies



blackboxing as a multilayer process that has philosophical, ethical and economic status and function. These threefold manifestation marks off subject and object, identifies the object as bundles of properties, defines needs and uses and considers objects as discrete, singularized, transactable entities. Blackbox products find their economic value in market within these three stances, where they are defined by a bundle of need-satisfying properties. This 'use' dependent formulation reduces this relationship to something that only makes sense as subject-object relationship (Slater, 2018).

Today, especially with the prevalence of digital technologies embedded in, products have become true blackboxes where the functioning bodies are completely sealed off. Proliferation of user experience and human-computer interaction design areas have provided possible easy ways of product-user interaction. Since the convenience, ease of use and availability in product use have become an important marketing strategy, the blackboxing process of the products has accelerated. These apparent advantages in product use introduced novel issues with it. As everyday life products turned into blackboxes, users' estrangement from the background environment of products such as working principles, technological infrastructure and underlying scientific knowledge increased even more compared to the past two centuries. There has been a significant weakening in users understanding of the infrastructure of the products. People's tendency to repair, upgrade, customization or personalization of owned products has decreased. In order to identify people trying to repair a broken electronic product, or adopting personalization or hacking, terms like 'geek' and 'nerd' were invented and the idea that they constitute a minority in society was deployed (Leadbeater & Miller, 2004). People's tendency to get involved in the processes has been sacrificed for the sake of social status. User-friendliness, as pointed out by Dunne (1999), is asserted as a bad norm tried to be achieved, obfuscates the ideology of design and encourages passivity.

Finished products are the fruit of modern, capitalist, consumerist econo-

my as an outcome of linear innovation and technology development models. They are designed and produced following the standards of industrial manufacturing and to conform efficiency, profitability and speed ambitions of capitalist economy. They are means to realize the idealistic mathematical calculations which pose contradiction with the overarching sustainability principles. When they are worn out and become useless, they still exist in the ecosystem. The solution of the industry and market for the worn out products is to forget about their presence, and again design, manufacture, distribute and encourage to consume a brand-new one (Bijker et al., 2008, 10). Brand-newness, identified as 'newness-for-the-sake-of-newness' (Papanek, 1985; Fry, 2015), is one of the most important strategies of capitalist industry that develops an entire marketing regime (Vinsel, 2017) which facilitates marketing activities by exploiting affective sides of consumers. Therefore, a product which embodies 'outdated' technology, materials, parts or design is intentionally pushed to the garbage of un-usefulness and substituted with a brand-new one even if it is still equipped with valuable, functioning parts or components. Even recycling may limitedly function. This suggests a need of change in the perspective of how the things around us are seen and what they mean to us. Blackbox product genre which adopts closed, consumption-oriented, disposable typology should be opened to questioning along with long-settled user behaviors. Like other utopian revolutions, the conditions of the present must be negated to bring a 'rationally' planned, sustainable world into being (May, 2011). The move of opening or closing blackboxes is a matter of the actor's perspective, intentions and projects, not the nature of objects (Slater, 2018). We see a great potential in design profession for such questioning and opening.

## 2.2. User: A passive persona

Design activity is turned towards to user (Norman & Draper, 1986). Designers, design products with the assumption that eventually a user will use that product. User in almost every design scenario is the person who will

initially interact with the product or interface. The term “user” implies a type of persona that exists solely for the purpose of using a designed product and this suggests that designers are primarily, and perhaps only, concerned with those aspects of users’ psychology and behavior which is directly relevant to the use of designed thing (Turner & Turner, 2011). From a critical perspective the term ‘user’ can be seen as a detached term, as it creates a degree of separation between the designer and the person(s) who is conceptualized based on statistical metrics or generalizations and supposed to use the thing designed. It can be said that the user is a conceptual model that informs designers’ design decisions. In other words, user doesn’t stand for an authentic existence but only for a self-serving construct invented to conform designers’ job by assuring that there is a ready-made audience for the designed products, services or systems. This ready-made audience most of the time is stereotyped with the intention to rationalize and simplify the design process under generalizable forms such as ‘expert users’, ‘novice users’, ‘older users’, ‘environmentalists’, ‘homeless people’, ‘rich people’, ‘physicians’, ‘welfare recipients’, ‘politicians’, ‘children’, ‘professors’, ‘career women’, ‘singles’, ‘drug addicts’ etc. (Schwind & Henze, 2020). Modelling people under certain stereotypical groups and as rationally behaving, calculable units (Mattila-Wiro, 1999), goes around with the demand of institutions and producers for homogenized clients and consumers (de Certeau, 1984).

The separation between designer and people in design process, as observed by Pruitt and Grudin (2003) hinders a true engagement of designers and users resulting with filtering out the social and political aspects. In order to restore these social and political aspects between designers and users, and to eliminate the vague notion that designers have related to their intended users, a technique which is called ‘persona’ is developed to ‘put a face’ on the users (Cooper, 1999). Personas, initially being fictional, are composite descriptions of people detailed with name, gender, age, occupation and attributes of real peo-

ple have such as belonged ethnic group, preferences, demographic information, socio-economic status etc. (Turner & Turner, 2011). According to Pruitt and Adlin (2006), personas are effective in design process as they help to promote user-centeredness, to manage the process of understanding users’ needs and preferences and as they act as a proxy in the absence of real users. Personas are created either as a result of ethnographic user research (Cooper, 1999) or relying on designers’ experience or intuition (Norman, 1988). Despite numerous studies demonstrating that creating personas is an efficient method for the design process, there are criticisms in terms of defining user needs and recognizing the user from a humane perspective<sup>4</sup>.

In the design process, a designer, tends to create a user representation in the form of stereotypes (Turner & Turner, 2011), personas (Cooper, 1999) or user models (Hasdogan, 1996). It is argued that such user representations constrain aspects related to design and everyday use and set shortcomings towards design for all (Stephanidis, 2001). As concluded by Turner & Turner (2011), the current design paradigm that separate designer and user, leads people to treat technology purely as instrumentally with little regard for the means. Borgmann summarizes this as commodification of technology (1984), highlighting the fraction between things and commodities. For him, commodities are context-free entities isolated from traditions and customs, while things are capable of engaging and connecting people. The difference between a commodity and a thing, brings the argument to the consumer culture, where one can easily observe that the so-called user is fundamentally the consumer. As de Certeau asserted (1984), in consumer culture non-producers, non-artists and non-designers become passive recipients of homogenized, ‘one-size fits all’ commodities.

Despite the fact that consumption is a natural aspect of human existence as a practice that constituted a prominent part of social life in all societies throughout human history, ‘consumerism’ or ‘consumer culture’ is argued to be a modern phenomenon that has been

developed initially in the West in the late seventeenth and early eighteenth centuries (Smart, 2022). Since the First Industrial Revolution, consumers have been pushed forward to the passive pole in production activities (Rayna & Striukova, 2016). Especially After WWII consumption started to be considered as the driving force of modern economies, and the role played by consumers progressively grew (Matsuyama, 2002), thus 'consumer culture' has become prominent. The closed nature of technology adopted in consumer culture also encouraged audience passivity (Brouwer & Mulder, 2008). Closed nature of technology resulted with users to lose contact and knowledge of the context, become passive, acquiescent and disconnected from their environment (Limei & Haoming, 2016)<sup>5</sup>.

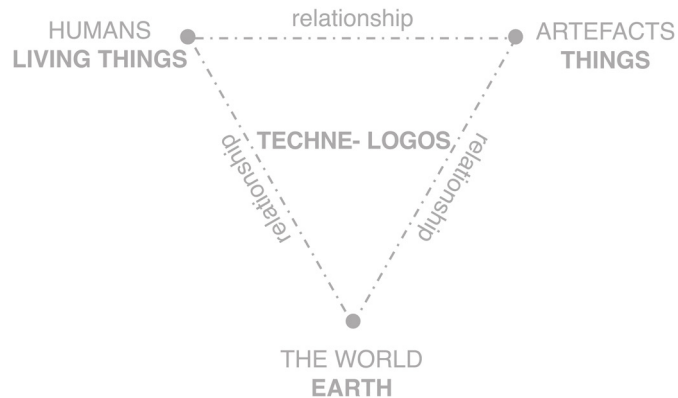
The term of 'user' and the methods such as stereotype, persona and user models which are used to increase the efficiency of the design process are associated with the consumption culture that emerged with industrialization. This is the case even in the user-centered design where designer interviews and/or observes passive users (Taoka et al., 2016) rather than inviting users to active participation to design process. Human subject, in both production and design processes, is treated either as a user or as a consumer, who has increasingly been pacified.

### 3. Bridging the GAP: Product-by-structures & prosumer

#### 3.1. Methodology

In the context of this research, where our aim is to propose a design framework which provides ways of establishing a free relationship with technology, we urge to reveal its substantivist position, locating it at the nucleus of complex networks of relationship between living-things, man-made things and the world. Our proposition is to conceptualize this substantivist position as *techne-logos*, in order to differentiate it from the instrumentalist and anthropological approaches. In search of a check and balance between the aforesaid stakeholders, we propose the technology triangle given in Figure 2.

We have conducted three consequent



**Figure 2.** Triangle of techne-logos.

4<sup>th</sup> year industrial design studio courses during 2018-2019 and 2021-2022 fall semesters in order to test and reinforce our assumptions in regard to this model with the participation of total 77 students. Figure 3 shows the project briefs and summary of the industrial design courses.

The process and the outcomes of industrial design studio projects helped us to reveal the potential of the model while in the same time directed us to update and modify the proposed model. Components of the model will be shared in the following sections.

#### 3.2. Product-by-structures

In the context of this research, in order to eliminate the deficiencies in regard to the finished products that are already mentioned in the earlier sections, a novel concept called Product-by-Structures (PBS) will be introduced. PBS are conceptualized as the dynamic and modular components that can be converged or transformed into finished products/product systems, by integration of physical, mechanical, electrical and electronic (digital) product properties in accordance with people's context-dependent needs. Besides, PBS are the 'phygitals' that can interchangeably operate with each other and the other surrounding products which enable re-configuration, upgrade and customization of designed products and systems. PBS are open, distributed artefacts which undertake the role to revitalize, enrich and sustain person-to-person, person-to-thing, and thing-to-thing interactions spatially. Fundamentally, in design of PBS,





of a practice or distributing fragments of knowledge, PBS are offered to take a role to support formation of competent human in Latour's (1993) human-non-human hybrid. PBS are not only the objects of consumption or use, but also objects of design and production enabling people to participate in the processes. They behave like interfaces between techne and people, interweaving things' technical capacities with people's skills and competencies. Using and interacting with PBS involves making, thinking, designing, feeling, building, constructing, producing, too. In creative processes including those aspects, relation between tools, materials and competence is plainly significant. And the process is typically transformative for both of those who perform such activities and for the physical objects and structures on which they work (Watson & Shove, 2008). PBS aims to support people to develop their 'embodied skills' (Hummels & van Dijk, 2015) by addressing perceptual-motor, cognitive and emotional skills in a balanced fashion. People need to interpret goods in order to assimilate them into their consumption (Slater, 2018) and PBS, by its open nature, urges such interpretation by inviting active involvement of people's embodied skills.

Another factor that is fundamental to PBS design is that it challenges the mainstream globalized production and consumption by converging the innovation capacities in the production field with the social networks by applying open design and distributed manufacturing principles. The design of PBS, seeks for maximizing the available sources in a holistic and connected manner, by considering the existing inventories of, for example, relatively novel co-working spaces such as MakerLabs, FabLabs, MakerSpaces, traditional craftwork ateliers and laboratories of schools or public institutions. Design of PBS aims to leverage distributed manufacturing in which traditional craftsmanship and SMEs are revitalized and brought about new perspectives in connection with relatively novel manufacturing techniques, e.g. rapid prototyping or digital prototyping platforms. This is a step taken towards sustainability, as it includes factors such as proper and economic use of

local resources, prevention of unnecessary logistics expenditures, and keeping cultural elements alive through design. Besides, by way of design of PBS, releasement of autonomy from the great centers of finance and decision making, self-sufficiency and resilience in the sociotechnical systems (Manzini, 2015) is targeted. Therefore, besides steps taken in favor of people and objects, PBS design seeks to provide ways for more sustainable futures of social, cultural and economic processes in the broader perspective.

Design of PBS, suggests a strategy to embrace the world of commodities and consumption, enabling people to use their own personal resources, cultural values and personal stances to construct their own lifeworld in their interaction with the material world. Additionally, it aims to elevate users' role to an active place rather than seeing them as passive receivers of designed products. PBS, opens a collaboration space among producers and consumers, where knowledge, skill and material resources of both parties are shared, hence a reciprocal relation is targeted. Besides they provide a more sustainable management of resources and products as production and consumption are not fixed at domains or dwellings.

The concept of PBS has potential to open a possibility of novel product-user relationship. PBS may enable people to develop a more insightful, intuitive and empathetic understanding of their ecosystem. As they begin to get involved in the processes, their perspective on their ecosystems may change, and they may start to evaluate things that are always at hand and therefore deemed worthless from the perspective of creating value. Observable increase of people's tendency to care about their environment and their demand to act for the good shows that there is a sympathy for such an understanding.

Heidegger, poses a relevant position for the concept of PBS. According to him a thing that falls under usefulness is always the product of a process of making (Heidegger, 1971). This explanatory position contains an explicit criticism directed at blackbox products and opens a legitimate way for PBS. He goes on to say that:

...as a rule it is the use-objects around us that are the nearest and authentic things. Thus the piece of equipment is half thing, because characterized by thingliness, and yet it is something more; at the same time it is half art work and yet something less, because lacking the self-sufficiency of the art work. Equipment has a peculiar position intermediate between thing and work...Therefore nonequipmental beings—things and works and ultimately everything that is—are to be comprehended with the help of the being of equipment (1971, 28).

When the two statements are combined together, it can be seen that:

1. Blackbox products can't become the products of a process of making when they fall under usefulness and,
2. They are not helpful in allowing people to comprehend the non-equipmental beings, namely the ecosystem around them.

### 3.3. Prosumption / prosumer

According to Dunne & Raby, design falls into two very broad categories: affirmative and critical design (2001). According to them, most design is performed in the affirmative circle, reinforcing how things and processes are today and acts in accordance with cultural, social, technical and economic expectations. On the other hand, the latter rejecting the necessity of things and processes to exist within the existing order; is in search of a critical stance of the current situation through designs that embody alternative social, cultural, technical or economic values (Dunne & Raby, 2001). In the sphere of Affirmative Design, people are positioned either as user or consumer of designed things. There is a clear Cartesian distinction between designer and user, and they are poles apart. Although design approaches such as user-centered design that are sustained with the claim of positioning the user as the central element have been developed, the main goal by examining the habits, behaviors and cultural values of the user, is to increase the commercial success of designs and make people to intrinsically adopt the culture of consumption. Affirmative Design reinforces the dichotomy of production-consumption, and

provides a norm of being user-friendliness that obfuscates the design ideology and encourages passivity (Dunne, 1999). In the context of this research, an alternative pro-active position is proposed that assumes ownership in how things and processes are executed instead of people's positioning as passive users and consumers of the designed objects. In order to demonstrate rationale behind this proposed position, we will take the concept of 'prosumption' (Toffler, 1981) as an umbrella term. The term is etymologically derived from the combination of nouns production and consumption.

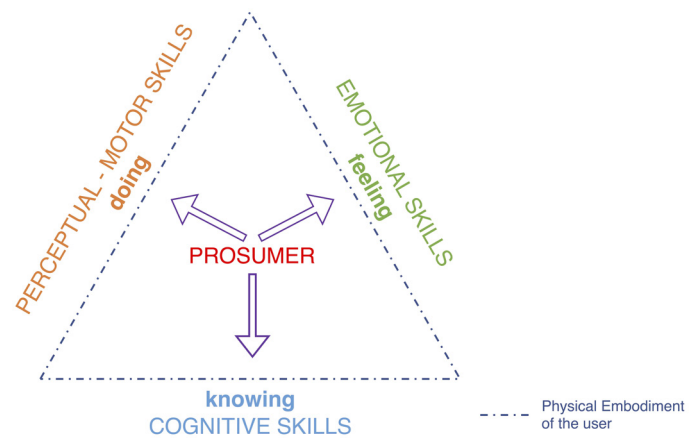
The studies and the practices around the issue is not limited to prosumption. The concepts such as "craft consumption" (Campbell, 2005), DIY (Watson & Shove, 2008), "user innovation" (von Hippel, 2006), "hacktivism" (Gunkel, 2005), "maker movement" (Dougherty, 2012; Hatch, 2014) or "Pro-Am" (Leadbeater & Miller, 2004) represent an emerging area in consumer culture where lay people increasingly get involve in design and production processes. As argued by researchers (see Benkler & Nissenbaum, 2006) the evolution of internet and the advancements in the field of Internet Communication Technologies (ICT) have led the way to change of the ontological status of people, namely users, from passive consumers to potentially active participants or producers. Consequently, the presence of mentioned evolving field of research shows that classical production-consumption dichotomy is being challenged by emerging productive paradigms, mostly started in digital environments (Dusi, 2015).

Campbell (2005), defines craft consumption as entailing the application of 'skill, knowledge, judgement and passion' and results in the production of something 'made and designed by the same person'. It is emphasized that in craft consumption attention is on authentic expression of people in contrast to the alienating production processes of industrialization. In a similar vein, DIY practices are defined by Watson & Shove (2008), as an important area of craft consumption where consumers are actively and creatively engaged in



integrating and transforming complex arrays of material goods. Von Hippel (2005), on the other hand, associating innovation with democracy, defines user innovation as users are increasingly able to innovate for themselves to develop exactly what they want, rather than relying on manufacturers to act as their imperfect agents. von Hippel makes a significant emphasis on the social collaboration asserting that people can benefit from the innovations that are developed by others in a free culture of sharing, instead of developing everything by themselves. Hacktivism, another approach that emphasizes people's increasing involvement in creative and productive processes, is a kind of commitment to creative and innovative computer programming and re-engineering of systems that pushed ICT to unexpected directions which were oftentimes not anticipated or recognized by their designers (Gunkel, 2005). It is important to note that, hacking practices, although started in the digital domain, is now becoming widespread in the physical domain with the help of advancements and proliferation of relevant technologies, where people increasingly engage in hacking physical things and hardwares (Taylor, 2005). Another attempt of people organized around creativity, innovation, make and use is the Maker Movement, whose fundamental characteristics are defined by Hatch (2014) in the form of a manifesto consisting of make, share, give, learn, tool up, play, participate, support and change. Last, but not least, another approach is the Pro-Am in which innovative, committed and networked amateurs working to professional standards who are argued to have the potential to create a big impact on shaping society in the near future (Leadbeater & Miller, 2004).

All these approaches, are in essence an attempt to reveal a reflex developed by people against the dominant understanding of production and consumption. These initiatives are the fruits of a culture of criticism that develops spontaneously but collectively against the intermediaries deployed between life and people, trying to cultivate alternative lifestyles to the imposition of a standardized global life. The common thing in all these approaches is the intention



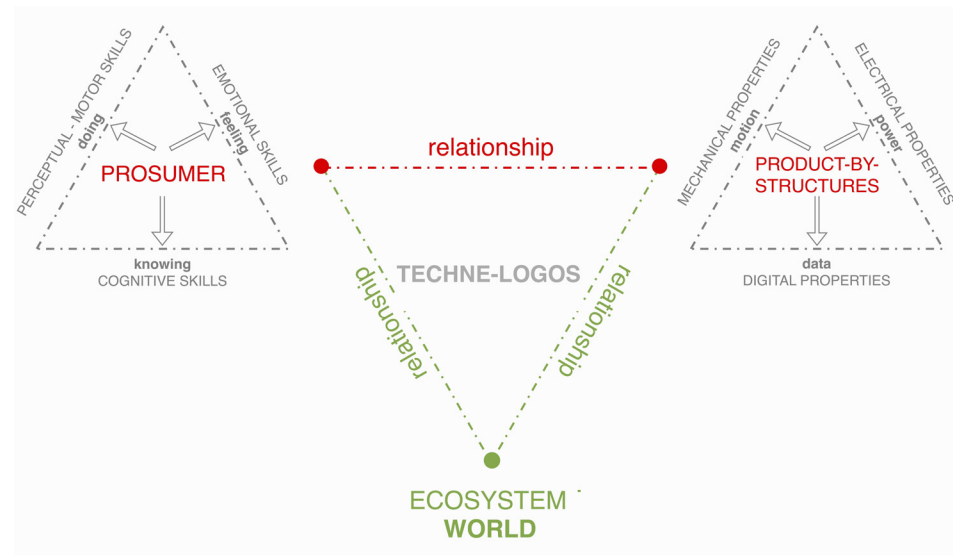
**Figure 5.** Conceptualization of prosumer as competent human agents.

to sustain the production and consumption activities, which is intrinsically inherent in nature and also human beings, with their own knowledge, skills, competence and resources, without being dependent on corporate intermediaries. These initiations may be seen as the quest for a decentralization in our urge to construct our lifeworlds by way of actively involving in the processes, actively engaging with others that consist of people, nature, living things and man-made things around us. Such initiations are regarded as an oasis of personal self-expression and authenticity in what is an ever-widening 'desert' of commodification and marketization (Campbell, 2005). Therefore, in the context of this study we consider the concepts of prosumption and prosumer as umbrella terms, in order to focus on the big picture where the ultimate aim is common without caring about the minor differences between these approaches that serve basically to the same worldview<sup>6</sup>.

Figure 5 is a simple diagrammatic presentation of how we conceptualize Prosumer as competent human agents.

#### 4. Discussion

Paradox of the designed world, which refuses to accept the givenness of Dasein, is that it creates a world to which even the designer is to some degree forced to submit (Mitcham, 2001). All designed things to some extent go beyond their design; they always have what are called unintended (undesigned) consequences (Merton, 1936). Then, if the ultimate faith of an intentionally and calculatively designed object is to come up with



**Figure 6.** Balanced integration of PBS, prosumer and world: techne-logos.

unintended consequences, then we shall design things for these unintended consequences intentionally. Designing intentionally for unintended consequences give a legitimate position for PBS. Friedrich Hayek (1967) noted that artifice can be ‘the results of human action but not of human design’ (Mitcham, 2001). Non-design, always encloses design; as design can never be ultimate, it must recognize its limits. In design, results extend beyond intentions – and these results become phenomena to which we, even in our attempts to redesign them or to design around them, must accept. To address such problematic will include the attempt to discover an approach to design that recognizes and addresses the limits of design. PBS is a concept that is supported by non-design as it is modeled as results of human action, but not only human design. Just because action is the human life itself, its object must be integrated with this life. Things that we are in relationship with and interacted to have to open the way for human action and lead us to establish a free relationship with technology. Departing from this, a diagrammatic representation of our proposed model of techne-logos that consists of the balanced integration of PBS, Prosumption and the contextual world is shown in Figure 6.

## 5. Conclusion

In this paper, towards establishing a free relationship with technology, we

have introduced a novel concept called Product-by-Structures (PBS) with the intention of inviting human action into our interaction with the material world. PBS has this potential of revitalizing human action as it is conceptualized as:

- dynamic and modular components that can be converged or transformed into finished products/product systems, by integration of physical, mechanical, electrical and electronic (digital) product properties in accordance with people’s context-dependent needs.
- the ‘phygitals’ that can interchangeably operate with each other and the other surrounding products which enable re-configuration, upgrade and customization of designed products and systems.
- interchangeable modular components that enable the re-configuration, upgrade and customization of designed products or product systems,
- open, distributed artefacts which undertake the role to revitalize, enrich and sustain person-to-person, person-to-thing and thing-to-thing interactions spatially while encouraging people to involve in design and production processes.

We have associated the concept of prosumption as an umbrella term with PBS. We have tried to show that people’s own knowledge, skills, competences and resources may be invited to everyday interactions with the objects around by way of designing PBS as an alterna-



tive to finished products.

Our proposal needs to be tested in settings where pillars of our age such as sustainable development, social innovation or circular economy are foreground and where individuals, societies and institutions urge for a better, greener and healthier future.

## 6. Further work

In this paper, we have tried to reveal our framework conceptually based on theoretical argumentations. Industrial design studio project processes and outcomes couldn't be covered in detail in this publication due to quantitative limitations. Methodological and practical aspects of the study are planned to be shared and discussed in a further publication where the results of expert evaluations and thematic analysis of the project outcomes will be presented.

## Endnotes

<sup>1</sup> Where craftwork is seen as humane and liberating, enabling individuals to engage in authentic, expressive and creative activity, factory-based and automated machine production is considered to have the opposite effect, not simply eliminating this possibility, but also creating a class of alienated workers. It is this model that has, by extension, frequently been carried over into the realm of consumption. (Campbell, 2005).

<sup>2</sup> The issue related to printers has been discussed in detail by (Malinauskaite & Erdem, 2021).

<sup>3</sup> When there is no profit to be made from the product, the product is economically considered 'dead' (Slade, 2008). Most of the time, even if the product is considered economically dead, all its parts, components, technological infrastructure, chassis, case, materials etc. are still there, alive and ready to function. Such practice is referred as "destructive creation" by Calvano (2007) where new, perhaps improved generations of durable goods are introduced to destroy, directly or indirectly, the usage value of units previously sold inducing consumers to repeat their purchase. It can be said that the finished product serves as a tool for the economy, which must comply with the demands of corporate stakeholders that is in Weber's

term "pursuit of profit, and forever renewed profit, by means of continuous, rational, capitalistic enterprise" (Weber, 1988, 17).

<sup>4</sup> See Floyd et al. (2004), Ronkko, Hellman, Kilander, and Dittrich (2004, pp. 112-113), Massanari (2010) for critical analysis of persona creation in design activity.

<sup>5</sup> See (Wimbauer, 2020) and (Von Hippel, 1977) for a detailed discussion on manufacturer-active-paradigm.

<sup>6</sup> For a detailed exposition of the people's tendencies and motives to participate in DIY, Craft Consumption, Prosumption like activities reader may refer to Watson & Shove (2008).

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