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# Characterising the low-tech approach through a value-driven model

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**Abstract**

In this article, we argue that the low-tech narrative redefined by a French low-tech movement in recent years can be considered as a legitimate research object for design research. Based on the French low-tech movement's literature, we present the definitions of the low-tech concept as an approach driven by principles and highlight two theorical limitations of this type of definition. Based on a value-sensitive design approach, we present transdisciplinary research results through a value-driven low-tech model and discussed its limitations and possible use as a tool for engineers.

*Keywords: low-tech, philosophy of technology, value sensitive design, sustainability, value-driven design*

## 1. Introduction

"*Humanity is currently living far beyond the planet's means, consuming the Earth's renewable resources as if we had one and a half planets at our disposal. At the same time, millions of people live in appalling destitution.*"(Raworth, 2014). Due to human activity, humanity faces a significant ecological and social crisis: climate change, forces of immigration, and the polarisation of politics and society are all examples of 21st-century wicked problems (Kossof, 2019). The inability of engineering to integrate the diversity of values defended by different groups in our modern societies into the formulations of objectives leads to rebound/ undesired ecological and social effects described as wicked problems (Rittel, 1987). This inability to cope with values stems from the influence of modern science and technological rationality, which leads to the emphasis on efficiency criteria at the expense of other values, political visions and powerful narratives (Rittel, 1987; Feenberg, 2002)

In response to this techno-optimistic vision, a low-technology (Low-tech) alternative narrative has emerged and generated interest in the literature in recent years (Tanguy et al., 2023). Low-tech questions the effects of technology on society and its environment and is considered "*as a credible option for the mitigation of environmental and social crisis*" (Martin et al., 2023), thus tackling wicked problems.

The low-tech narrative challenges the engineering and industrial community to adopt a systemic view of the interwoven effects of both technical, environmental, and social dimensions. It proposes an approach that has resulted in numerous interesting case studies and frameworks for the design community.

However, the term low-tech is ambiguous (Tanguy et al., 2023) and needs to be revised (Martin et al., 2023). There needs to be a straightforward approach or tools to implement it into design activities. This raises the question of the definition of the low-tech concept.

In this paper, we claim that by defining the low-tech concept from the vision of society it narrates, it is possible to design a value-driven low-tech model useful for engineers wishing to adopt a low-tech approach.
In the rest of this article, we argue that the low-tech narrative redefined by a French low-tech movement in recent years can be considered as a legitimate research object for design research. Based on the French low-tech movement's literature, we present the definitions of the low-tech concept as an approach driven by principles and highlight two theorical limitations of this type of definition. We will argue in favour of an alternative reasoning to define the low-tech concept and overcome these limitations: This is to investigate values that technical systems should satisfy in a perspective based on a low-tech societal project narrative. Based on a value-sensitive design approach, we present transdisciplinary research results through a value-driven low-tech model and discussed its limitations and possible use as a tool for engineers.

## 2. Review of the low-tech concept in french low-tech movement

The French low-tech movement is characterized by its use of the term low-tech as a narrative centered on the role of technical systems in the mitigation of social and environmental crisis. This movement is composed of various actors from individuals from authors to private and public organization of diverse size and from diverse domains.
This review is based on the French low-tech movement's literature which includes literatures from books, newspapers and web site publications, research reports as well as student projects reports in various domains such as design, philosophy, anthropology and sustainability.

### 2.1. The low-tech phenomenon

The term Low-tech has been popularised in France with the publication of the book "*The age of Low-tech*" by Philippe Bihouix (2020)[1]. Against a backdrop of environmental and social crisis, the book denounces the thoughtless and dispersive use of metals in the service of a high-technology society. The term "low-tech" is proposed in opposition to "high-tech" and, more broadly, to "technical progress".
Philippe Bihouix's book is registered within technocritics' current of thought. Technocritic is an approach that aims to criticise our relationship with technology. It can include analysing the economic, social, political and ethical implications of technology and its advantages and disadvantages. The concept of low-tech is similar to other concepts developed by technocritical authors (Schumacher's "intermediate technologies" (1973) or L. Mumford's "democratic techniques" (1963)). Recently, several players in the low-tech movement have emphasised the filiation of the low-tech concept within technocritics current of thought (Mateus, 2023; Bruyère, 2023).
The Low-tech Lab association, created in 2014, has also contributed to a broader dissemination of the term (Gilabert, 2020).
Before the rise of these two players, the term was used by Chris De Decker's Low-tech Magazine in opposition to high-tech. They quote: "*questions the belief in technological progress and highlights the potential of past knowledge and technologies to design a sustainable society*." (Decker, 2008). As the magazine is known to P. Bihouix and the pioneers of the Low-Tech Lab association, he probably inspired using the term.
Since 2014, a French national dynamic has been observable through the use of the term by diverse actors of the society gathered around the question of the place of technology in our society. In 2019, the first national meeting of low-tech players was organised by the Oséons association, bringing together numerous associative and academic players as well as individuals[2]. In recent years, the number of events (Festival Low-tech Lab in Concarneau city, Festival Low-tech Apala, Forum des low-tech in French *grande école* Centrale Nantes) centred on the term has risen considerably, bringing the term "low-tech" to a broader audience (Meyer, 2021).

[1] The Original French version was published in 2014.
[2] List of the participant available at: https://rencontres-acteurs-low-tech.gitlab.io/ils-sont-interesses



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Low-tech is also emerging as a credible option at an institutional and territorial level for ADEME, a public institution under the authority of the French government, which helps to implement public policies on energy and environmental protection. ADEME published their understanding of the term low-tech[3], launched a territorial experimentation of a "low-tech" region in Brittany[4] and calls for joint research projects aiming at the federation and organization of the low-tech professional sector into a legitimate interlocutor for French public institution.

The term is also used and integrated into design practices of large, small and medium companies which provide products and consultancy services at different scales (from artisanal to industrial). Decathlon shows interest in the concept by organising a low-tech innovation challenge[5]. Labelletech is a consultancy company composed of Arnaud Crétôt an entrepreneur baker and coffee roaster using a solar oven generally considered as low-tech, and Elise Hauters, co-manager of CPM Industries. This company originates from the partnership between these two actors, which resulted in the production of the solar oven and the integration of a low-tech approach in CPM industry's design activities. Also, several small companies proposed products such as Norwegian cookers and DIY formation for low-tech solar heating systems.[6]

Finally, in the context of university teaching and research, the LowTRE community exchange on the forum of the same name[7]. Among other communities of researchers, the EcoSD community dedicated its annual thematic workshop on Low-tech within its community of researcher, industrial and institutional actors.[8] In addition, several articles by ergonomics, sustainable design, technical anthropology and industrial engineering researchers seek to define this new term better and determine its implications for design.

If "low-tech" seems to be a legitimate research object, it is impossible to speak of a low-tech concept yet. Indeed, the definition of the term "low-tech" has not been theorized into a precise concept (Tanguy, 2023; Colin, 2023).

## 2.2. The research of a standard definition: low-tech as an approach from principles

Contrary to what we might think, the term is currently tending not to be defined as a category of technology that would be defined in opposition to the category of "high-tech" but rather as an approach, i.e. a principle driven approach that aims to integrate environmental and social values into our relationship with technology. For example, Bihouix defined a "low-tech approach" based on 7 principles: *Question needs, Design and produce sustainably, Seek a balance between performance and conviviality, Relocate without losing (good) scale effects, "Demachinize" services and Know how to remain modest* (Bihouix, 2020). Similarly, we can cite the low-tech lab tagline, which defines low-tech by three major principles: Useful, Accessible, and Sustainable. Numerous players of the low-tech movement are involved in developing the meaning of a low-tech approach. In particular, in the Manifesto of the Ecological Factory, Bihouix et al. (2019) propose key defining concepts such as the "low-tech approach" and "low-tech innovation".

Initial academic research has been carried out to identify invariants within this diversity of approaches using cross-analysis of bibliographical and grounded data (Tanguy et al., 2023; Martin, 2022). This research resulted in identifying common denominators within the low-tech movement and proposing new principles. Tanguy et al. (2023) proposed seven fundamental principles: Decreased resource consumption in technology, new or extended service lives, appropriation, collective networks, going *back to basics, limited external dependency, and context dependency.*

[3] Rapport Démarche "Low-Tech" available at: https://librairie.ademe.fr/dechets-economie-circulaire/5421-demarches-low-tech.html

[4] Low-tech Lab – [EN COURS] Vers un territoire low-tech en Cornouaille / 2022-2023. (n.d.), available at: https://low-techlab.org/fr/le-low-tech-lab/les-actions/territoire-low-tech

5 Low-tech innovation challenge event (2023), available at : https://cocreation.decathlon.fr/projects/1351

[6] For example, L'avant-d'après et Enerlog

[7] Forum LowTRE (standing for Low-tech-Research-Education), available at: https://forum-lowtre-ecosesa.univ-grenoble-alpes.fr

[8] Program of the event and resources (2023), available at https://www.ecosd.fr/ata-2023/



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Despite the contribution of clarifying the term low-tech, we found that these definitions by principles meet two theoretical limitations. The first is that it fails to justify the number of principles, and the second is that it fails to explain the potential hierarchy between principles, which only a theory could do. Béranger (2022) argues that low-tech can be understood as a narrative that varies according to the actors involved and can contradict each other. From this perspective, the definition of an approach varies according to its objectives, which themselves vary according to the implicit or explicit values and political visions of the players involved.
In order to overcome these theoretical limitations, the definitions of low-tech could clarify the values and political visions underlying the concept of low-tech.

#### *2.2.1. A perspective based on a societal project narrative*

This is the proposition made by Carrey (Carrey et al., 2020) and analysed by Bernaud (2021).
Carrey et al. (2020) write that they "*seek to clarify this definition by grounding it in a global vision of the technical system"*. They *"propose to consider a technology as low-tech if it constitutes an elementary technical brick of a sustainable, equitable and convivial society*". Their project of society is based on three explicit values.
Bernaud (2021) analyses that a conceptual framework for this kind of definition must meet 2 conditions:

1. It must clarify final values, i.e. values achieved because of their intrinsic goodness (Zimmerman, 2004), a normative clear horizon and ends.
2. It must be situated on the scale of society, understood as a set of socio-technical systems, insofar as an apparently positive effect on the level of a technical object can have a negative effect on the level of the system within which it is embedded, so called wicked problem. As such, Carrey also stated that "*only a global analysis of the socio-technical system can qualify the elementary bricks that make it up.*", making it clear that a conceptual framework should allow a systemic approach.

In that sense, a possible way to define a low-tech approach would be to hierarchise the values of a specific political vision by logical reasoning, thus articulating the ends of low-tech narrative with the means of low-tech principles. In the next section, we propose to explore the values of a low-tech approach based on an explicit societal project narrative.

## 3. Defining a low-tech approach as the embodiment of a low-tech society narrative

### 3.1. Method

Based on a Value Sensitive Design approach (Van de Poel, 2013), discussions between the author and Bernaud, a French philosopher in the low-tech movement, led to the argumentation of autonomy as the final value of a low-tech society project. Then, the discussions led to the hierarchisation of principles from low-tech approaches considered as values. It enabled the description of rationales on the consequences of Autonomy, as a goal for a society, on the technical systems it contains. This approach led to the design of a value driven low-tech model in which values and their relations are conceptualised. As a result, this iterative process of discussions enabled us to answer 2 questions necessary to design a hierarchical low-tech value structure.

#### *3.1.1. What is the final value of a low-tech society project?*

The answer lies in the proposition of what is known in philosophy as a "theory of justice", i.e., an explanation of the concepts that underpin a model of a just society. Drawing on earlier work by Bernaud (2021) and Mateus and Roussilhe (2023), we propose to base the theory of justice on the value of autonomy. On one hand, it is a value used by the main promoters of the concept, such as Bihouix and the Low-tech Lab. Whether in the direct reference to Ivan Illich's conviviality in the first case, or through the concept of accessibility in the second, both refer to the meaning attached to the concept of autonomy. On the other hand, we found that this concept gives meaning to all the concepts on which the low-tech philosophy is based. In an earlier work, Bernaud (2021) proposed a theory of



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justice based on the concept of need, another central concept in the low-tech movement, which he saw as sufficiently universal to found a theory of justice of a society. However, Bernaud argues that the concept of autonomy is more fundamental than the concept of need because, at a biological level, it is possible to assert that it is autonomy, as a vital process of self-organisation, or autopoiesis (Varela and al., 1974) that is the source of a normativity, leading to the definition of what is good or bad, and therefore to the definition of the needs of the biological system (Virenque, 2023). If we apply this concept to a social system, two levels of autonomy emerge: a technical autonomy in the sense of a community's ability to satisfy its own needs through the design and use of artefacts, and a political autonomy, in the sense of a society that gives itself its own laws. Political autonomy thus corresponds to democracy in the strongest sense of the term. Furthermore, if we follow Berlan (2021), technical autonomy is a precondition for political autonomy, to the extent that a society unable to function independently would not be able to enforce its own rules. It seems to us that this is precisely what lies at the heart of the low-tech movement's criticism of technology. In our view, all the other concepts, including those relating to sustainability, are subordinate to that of the quest for autonomy, understood as the capacity for self-organisation at all scales, from the living to the politics.

#### *3.1.2. How to structure and hierarchise the different values?*

The answer of this questions is based on Ibo Van de Poël's approach in his article "Translating Values into Design Requirements" (Van de Poel, 2013). In this approach, the author proposes the design of a value hierarchy composed of 3 inter-related layers: values, norms, and design requirements. The values are more general and abstract from the lower elements. They are relevant for evaluating the worth of a project. In our case it helps us evaluating the worth of the principles, considered as values, according to the final value of autonomy. The elements of the hierarchical structure of values are linked by normative relations in the sense that "*the higher elements provide reasons for the lower-level elements*" (Van de Poel, 2013) or, the other way round, that lower elements are done "for the sake" of upper elements. For example, the design of a wooden spoon is made in the sake of a prescription norms of recyclability which is a way of achieving sustainable values.

Norms and design requirements are not considered as they would need a context of the type of socio-technical systems involved. Hence, our proposition is not a value hierarchy in the sense of Ibo Van de Poël because it described only the value layer. As such, we will consider our proposition as a hierarchical model of values.

In the previous paragraph, we argued that autonomy is the final value of a low-tech society project. It is therefore the upper element of our model of values. Other values are done "for the sake" of autonomy and are deduced by the plausible implication it would have on the socio-technical system of a society.

In the following sections, we present a model of values as a definition of a low-tech approach based on a societal project narrative which considers autonomy as its final value.

### 3.2. Towards a value-driven low-tech model

From the value of autonomy, a rationale of 3 core values (democratic governance, functional and sustainability) is proposed. Then, for each core value, a similar rationale is proposed in order to link principles from the low-tech movement literature.

Figure 1 is a simplified graphical representation of the value-driven low-tech model. Each lower value is made for the sake of the upper value stacking up to achieve autonomy.



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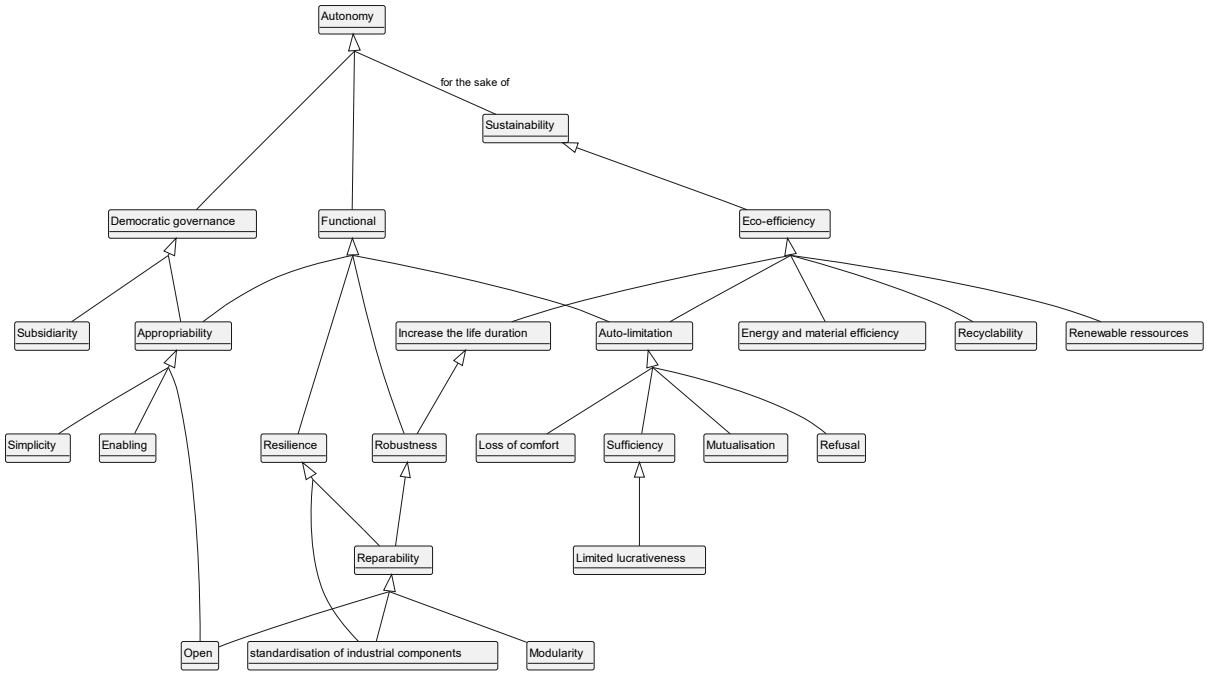


**Figure 1. Value-driven low-tech model**

### *3.2.1. Autonomy*

Autonomy is the process of self-organisation by which a system sets its own rules to meet its ends. Applied to the scale of a society, autonomy must be understood in terms of political and technical autonomy (Berlan, 2021).

Political autonomy is society's ability to give itself its laws.

Political autonomy thus corresponds to democracy in the most vital sense of the term. Democracy enables us to make decisions about production, i.e. what we produce, but also about what we consume, i.e. what we need and how we can satisfy our needs. If individuals want to be able to define the ends that are important to them, they need to be able to participate in defining these ends and the way they can be satisfied. In that sense, autonomy implies a form of democratic governance on the socio-technical choices made to satisfy the needs of the society.

Technical autonomy is the society's ability to satisfy its ends by designing and using artefacts (understood here as products or technical systems). It implies that artefacts are functional in the sense that they are helpful because they meet an individual's needs.

Also, if individuals want to continue to achieve their ends, they need to be able to ensure that their living environment is habitable. In that sense, autonomy also implies the sustainability of society and its socio-technical system through preserving the natural environment and the services it provides.

### *3.2.2. Democratic governance*

As Richard Sclove (1995) has shown, any technological choice, from the moment it structures society and the environment in a certain way, must result from a democratic choice.

Democratic governance enables a democratic choice in all design activities and is mediated by specific characteristics of the artefact or the organisation.

Appropriability, in the sense that individuals need to develop a relation with the artefact to assess its goodness. The assessment can be done in different manners: The capacity of enabling users, the openness of the artefact in the sense of its information accessibility, and its simplicity, as the opposite of complexity, so that the simpler systems are, the fewer components or constituent relationships they have, the simpler they will be to understand and handle.

The principle of Subsidiarity ensures that anything that can be decided at a lower level should be decided at a lower level to have control over production or techniques. This makes it easier to organise locally. However, some techniques, such as nuclear power station networks or railway networks, cannot be



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selected or produced locally. In this case, subsidiarity should be applied on a larger scale, such as a federation, a region or a state.

### *3.2.3. Functional*

Functional artefacts (understood as products or technical systems) should meet useful needs. In that sense, it is necessary that all its functions fulfil needs considered as useful. As such, Auto-limitation considers that a function does not meet society's ends. This value is met in various manners: by refusing the use of an artefact (planes for example); by sharing the use of an artefact and therefore limiting its possible use for each individual; by accepting a loss of comfort (for example the use of mechanical bike instead of an electric one) and thus limiting the use of a function, and by self-limitation of production, in the sense of the norm of sufficiency (Gorz, 2019) and, therefore limiting the number of artefacts to a sufficient level (a useful one). The norm of sufficiency implies limited lucrativeness, in the sense that you will not seek to produce to make a profit superior to what is necessary to meet the needs of the people involved in the business.

A functional artefact needs to ensure its function over time. Due to the different scales of the artefacts involved, we proposed to define Robustness as the stability of performance over time, under small perturbations and conventional product usage. Resilience is the system's ability to cope with misuse, damage or extreme shocks without losing function. Both of these values, Resilience and Robustness, can be achieved through Reparability (as a characteristic of the artefact of being repaired and parts of subsystems easily changed) and by Standardisation of components in the sense that this will reduce the variety and the complexity of the technical systems while allowing interchangeability across systems. Reparability is favoured by the Standardisation of components but also through Modularity and Openness of the artefact in the sense that individuals can understand and study how it operates. Finally, a Functional artefact should be appropriable (as described earlier) and, as such, also simple, enabling and open.

### *3.2.4. Sustainability*

Sustainability is defined as the balance between what you need in terms of resources and what you emit in terms of pollutants, and what nature can provide in terms of resources and what it can receive in terms of pollutants. Therefore, sustainability is defined by the ability of a society to preserve its resources and ecosystem services, such as pollution storage, the creation of resources, and more global regulatory functions such as climate regulation or aesthetic relationships.

To preserve resources and ecosystem services, we need to maximise the efficiency of the economy, which we reconceptualise in terms of satisfying needs (rather than in economic ones), in the sense that efficiency is a relationship that maximises the satisfaction of the needs with minimal environmental impact.

This eco-efficiency is met through various *traditional* sustainable values such as Recyclability, Reusability, Energy and material efficiency and using renewable resources.

Increasing the life duration of technical systems is another way of meeting eco-efficiency, which implies the robustness of the artefacts (a value which had already been described).

Auto-limitation, also defined earlier, is another way of meeting eco-efficiency.

## 4. Discussion

The model can be used as a tool to help implement a low-tech design approach, i.e., an approach that aims to design socio-environmental-technical systems that promote the autonomy of the members of a society. This implies a systemic analysis of all the socio-technical systems (organisations, production machines, products, services) and their consequences for the environment and society over their entire life cycle (from extraction to end-of-life) to ensure the sustainability and democratic governance needed to guarantee political and technical autonomy in this society. However, in its current state, the use of this model is largely left to the designer's understanding.

Several limitations of the model of values can be highlighted. The principles on which the model is based originate from an exploratory literature review and not a state of the art. Therefore, a state of the



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art could highlight other principles. Furthermore, it also raises the question of the nature of our logical implications, as "*a relation of A being done for the sake of B can therefore be seen as the placeholder for a number of more specific relations. One possibility is that A is a means to B. Another possibility is that A is a subordinate goal or end, the achievement of which contributes to (the achievement of) B. A third possibility is that A enables the achievement of B, without itself contributing to that achievement. If A takes away an obstacle to B, A may be done for the sake of B."* (Van de Poel, 2013). Finally, to better guide the designer, it is necessary to specify the definition of the values proposed in our model as well as their application in design practices. This will be possible by carrying out a literature review on the values of democracy and sustainability in the field of Design for value (Hoven, 2015).

## 5. Conclusion and perspective: toward a value-driven low-tech ontology

This paper presents the results of a transdisciplinary exploratory research on the low-tech concept. After exploring the low-tech phenomenon and arguing in favour of defining the concept from the vision of society it narrates, we proposed a value-driven low-tech model based on a value-sensitive design approach.

This first attempt at translating Low-tech values into design requirements has shown that there is still a long way to go in order to define a consistent value-driven low-tech ontology that could be integrated into an efficient engineering tool.

We believe such an ontology could be part of a requirement engineering tool that would allow the designer to elicit design requirements of low-tech solutions and integrate the approach into modern model-based engineering systems. This is necessary to scale up the approach and its integration into a wider engineering practice. Indeed, this initial value model does not yet connect values and functional requirements, nor do they with norms. Further research will aim to conceptualise values better and better understand their relationships with the different elements of the system (values, norms, design requirements, social, environmental and technical dimensions, needs, stakeholders, scale). Finally, a grounded approach consisting of case studies of design activities implementing a low-tech approach would bring specific norms and design requirements to the value-driven low-tech ontology.

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### References

Béranger, A. (2022), "Médiatisation du phénomène low-tech", presented at the Doctorales de la Société Française des Sciences de l'Information & de la Communication (SFSIC 2020.

Berlan, A. (2021), Terre et liberté. La quête d'autonomie contre le fantasme de délivrance - Aurélien Berlan, La lenteur.

Bernaud, W. (2021), Vers Une Démocratie Territoriale Low-tech, Mémoire de fin d'études MSc Strategy and Design for the Anthropocene Année 2020 - 2021, p. 81.

Bihouix, P., Baumes de Brosses, E., Besse, G., Bonnifet, F., Darras, M., Désaunay, T., Gancille, J.-M., et al. (2019), Vers des technologies sobres et résilientes - Pourquoi et comment développer l'innovation "low-tech" ?

Bihouix, P., (2020), The Age of Low Tech, 1st ed., Bristol University Press, https://dx.doi.org/10.2307/j.ctv177tgng.

Bruyère, N., Geel, C. and Petit, V. (2023), Global Tools (1973-1975) - Eco-Design : Dé-projet & Low-Tech.

Carrey, J. and Lachaize, S. (2020), "La recherche scientifique en Low-Tech : définition, réflexions sur les pistes possibles, et illustration avec un projet de métallurgie solaire", La Pensée écologique, Presses Universitaires de France, Paris cedex 14, Vol. 5 No. 1, pp. 7–7, https://dx.doi.org/10.3917/lpe.005.0007.

Colin, C. and Martin, A. (2023), "The user experience of low-techs: from user problems to design principles", Vol. 18, pp. 68–85.

Decker, K.D. (2008), "About", LOW←TECH MAGAZINE, available at: https://solar.low-techmagazine.com/about/ (accessed 17 November 2023).

Feenberg, A. and Feenberg, A. (2002), Transforming Technology: A Critical Theory Revisited, Oxford University Press, New York, N.Y.



https://doi.org/10.1017/pds.2024.238 Published online by Cambridge University Press

Gilabert, C. (2020), “Pourquoi l’alternative low-tech tarde à se généraliser”, Usbek et RIca.
Hirsch-Kreinsen, H. (2008), “‘Low-Tech’ Innovations”, Industry and Innovation, Routledge, Vol. 15 No. 1, pp. 19–43, https://dx.doi.org/10.1080/13662710701850691.
Gorz, A. (2019), Éloge du suffisant, Presses Universitaires de France.
Illich, I. (1973), La Convivialité, Du seuil.
Kossoff, G. (2019), “Cosmopolitan Localism: The Planetary Networking of Everyday Life in Place”, Cuadernos Del Centro de Estudios de Diseño y Comunicación, No. 73.
Martin, A., Gaultier, A. and Colin, C. (2022), “Cartographie du concept low-tech : guider la conception vers des techniques soutenables”, presented at the 56ème Congrès de la SELF, Vulnérabilités et risques émergents : penser et agir ensemble pour transformer durablement, p. 144.
Mateus, Q. and Roussilhe, G. (2023), Perspectives low-tech, Divergences.
Meyer, M. (2021), “Experimenting and documenting low tech”, Technology Analysis & Strategic Management, Routledge, Vol. 33 No. 10, pp. 1147–1158, https://dx.doi.org/10.1080/09537325.2021.1914834.
Mumford, L. (1963), Techniques Autoritaires et Démocratiques.
Van de Poel, I. (2013), “Translating Values into Design Requirements”, in Michelfelder, D.P., McCarthy, N. and Goldberg, D.E. (Eds.), Philosophy and Engineering: Reflections on Practice, Principles and Process, Springer Netherlands, Dordrecht, pp. 253–266, https://dx.doi.org/10.1007/978-94-007-7762-0_20.
Raworth, K. (2014), A Safe and Just Space for Humanity.
Rittel, H.W.J. and Webber, M.M. (1973), “Dilemmas in a general theory of planning”, Policy Sciences, Vol. 4 No. 2, pp. 155–169, https://dx.doi.org/10.1007/BF01405730.
Schumacher, E.F. (1973), Small Is Beautiful - Une Société à La Mesure de l’homme, Points.
Sclove, R. (1995), Democracy and Technology.
Varela, F.G., Maturana, H.R. and Uribe, R. (1974), “Autopoiesis: The organization of living systems, its characterization and a model”, Biosystems, Vol. 5 No. 4, pp. 187–196, https://dx.doi.org/10.1016/0303-2647(74)90031-8.
Tanguy, A., Carrière, L. and Laforest, V. (2023), “Low-tech approaches for sustainability: key principles from the literature and practice”, Sustainability: Science, Practice and Policy, Taylor & Francis, Vol. 19 No. 1, p. 2170143, https://dx.doi.org/10.1080/15487733.2023.2170143.
Virenque, L. and Mossio, M. (2023), “What is Agency? A View from Autonomy Theory”, Biological Theory, Massachusetts Institute of Technology Press (MIT Press), https://dx.doi.org/10.1007/s13752-023-00441-5.
Zimmerman, M.J. (n.d.). “Intrinsic vs. Extrinsic Value (Stanford Encyclopedia of Philosophy/Fall 2004 Edition)”, Stanford Encyclopedia of Philosophy.



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