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► **To cite this version:**

Tatiana Reyes, Luis Miguel López Santiago, Liam Piaser. A conceptual framework for sustainable value creation: a case study of a French ecovillage. 32nd CIRP Conference on Life Cycle Engineering (LCE 2025), CIRP, Apr 2025, Manchester (UK), United Kingdom. pp.672-678, <10.1016/j.procir.2025.01.070>. <hal-05172384>

HAL Id: hal-05172384

<https://hal.science/hal-05172384v1>

Submitted on 21 Jul 2025

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32nd CIRP Conference on Life Cycle Engineering (LCE 2025)

A conceptual framework for sustainable value creation: a case study of a French ecovillage

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Abstract

Awareness of planetary boundaries underscores the need for systemic changes to maintain Earth's habitability. Local initiatives, such as ecovillages, are pivotal in driving sustainable transitions by fostering innovative social and technical solutions. Ecovillages, designed to regenerate social and natural environments, provide models of sustainable living that address the harmful effects of human activities. However, there is limited research on how ecovillages can generate sustainable value (SV). Drawing on both theoretical and empirical approaches, this article introduces a conceptual framework for co-creating SV in ecovillages, integrating their ecosystems, territories, actors, resources, and capabilities. The framework considers three stages for creating SV in the early phases of the design process: understanding the ecovillage ecosystem, analyzing the territory, and generating an SV proposition for the local territory. A case study of a French ecovillage illustrates how the framework facilitates the generation of concrete sustainability projects. This article highlights the impact of understanding SV creation in ecovillages for researchers and practitioners working on local initiatives with strong sustainability paradigm. It addresses the gap in recognizing the role of integrating actors and resources as essential for the sustainable transitions of the local territory. Further studies could focus on testing this framework in other ecovillages to evaluate its practical effectiveness in generating sustainable projects

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Peer-review under responsibility of the scientific committee of the International Academy for Production Engineering (CIRP)

Keywords: strong sustainability; ecovillage; sustainable value; cocreation; territory; capabilities; network actors; design process

1. Introduction

The overproduction and consumption driven by current economic and industrial practices have caused severe ecological issues, necessitating urgent changes to preserve the planet's habitability. While global political debates continue, community-led local alternatives tailored to specific contexts could offer significant pathways for action [1], [2]. Grassroots initiatives like ecovillages are key to driving the social and technical transition toward sustainability [3]. Ecovillages are participatory intentionally designed communities focused on four dimensions of sustainability—social, cultural, ecological, and economic—aiming to regenerate both social and natural environments [4]. They offer living models aligned with the

strong sustainability paradigm, demonstrating how prompt action can address the unsustainability caused by human activities [5]. The literature on ecovillages emphasizes the many benefits of adopting sustainable lifestyles, such as creating and testing new systems, improving quality of life, promoting ethical values, and reducing ecological footprints.

Ecovillages are pioneering new forms of collective organization with a focus on horizontal decision-making, shared values, and alternative narratives [6]. By leveraging local dynamics and actors, ecovillages build alliances, create value and enhance their impact [7], [8]. Research on design for sustainability, particularly in sustainable Product-Service Systems (SPSS), highlights that incorporating a territorial approach by identifying dynamics, resources, and actors fosters

a systemic strategy for designing value propositions [9]. Ecovillages offer promising contexts for experimenting with alternative practices, but limited research exists on how they and their local networks generate sustainable value (SV) within their territory. Therefore, frameworks and methods are needed to support and evaluate collective decisions on the technological options, resources and capabilities required to create SV through new concrete projects. Previous works using the SPSS approach have studied territorial value generation, but have focused on business contexts [10], [11]. In this regard, the present work differs by focusing on an ecovillage, whose objectives and strategies differ from those of profit-oriented companies.

This article proposes a conceptual framework for the co-creation of SV adapted to the context of an ecovillage integrating their ecosystems, territories, actors, resources, and capabilities. This framework has been built drawing on both theoretical and empirical approaches. The research approach is based on Delgadillo Jaime's [12] methodology on organizational collaboration to create sustainable SSPs in a territory. A case study allowed to validate the adaptation of this framework of a French ecovillage. Following this introduction, the article starts with a review of strong sustainability, ecovillages, and value creation tools, followed by the research methodology. It then presents key findings, discusses implications and limitations, and concludes with recommendations for future research.

2. Prior research

2.1. Strong sustainability

Sustainable development implies meeting the needs of the present without compromising the ability of future generations to meet their own needs. Two key theoretical paradigms shape sustainability. Weak sustainability argues that natural capital can be replaced by human-made capital, allowing wealth growth [13]. Strong sustainability emphasizes preserving irreplaceable natural resources, like ecosystems and biodiversity, to maintain overall capital value [14].

The planetary boundaries framework outlines nine critical processes for Earth's stability and resilience, and recent updates indicate that six boundaries have been breached [15]. This framework defines a "safe operating space for humanity" [15, p. 1], ensuring economic and social well-being while protecting the planet's ability to support future generations. The Raworth's [16] Doughnut Model advocates for the fulfillment of basic human needs (such as food, health, housing, education, and social equity) while respecting planetary boundaries. Strong sustainability requires major shifts in production, consumption, engineering, and design practices [5]. The planetary boundaries framework and Doughnut model support strong sustainability policies, emphasizing natural capital's irreplaceability and attracting interest from politicians, associations, organizations, and academics [14], [17]. The planetary boundaries framework and Doughnut model have sparked interest in local-scale implementation while maintaining global relevance [17]. This highlights the need to develop methodologies, tools, indicators,

and policies to implement and evaluate both models, particularly at the local level [17].

2.2. Ecovillages

Community-led initiatives, or grassroots initiatives, are experimental spaces where people collaborate to live more sustainably through bottom-up change way [3], [18]. These initiatives encompass sustainability projects, such as ecovillages, co-housing, degrowth cooperatives, and traditional communities [18], [19]. Rooted in conviviality and commons, they challenge the notion that green policies or capitalism can ensure future sustainability [20]. Ecovillages serve as sociotechnical spaces for testing innovative practices in governance, resource management, and social solutions to address socio-ecological crises. Emphasizing environmental regeneration and sustainable social practices, they prioritize well-being over economic growth and drive local resilience with globally impacts [18], [21]. Ecovillages address socio-ecological issues by developing locally tailored solutions, blending scientific and traditional knowledge to achieve lasting outcomes, empower communities, and promote development models to local realities [18], [19], [22], [23].

Ecovillages are pioneering new collective models based on horizontal decision-making, shared values, and new imaginaries [6]. They leverage territorial dynamics and, in collaboration with local actors, form alliances to generate value and amplify their impact [7], [8]. Ecovillages offer valuable settings for testing alternative development models and practices. However, models and frameworks for guiding technical and organizational decisions in territorial development under strong sustainability are lacking.

2.3. Assessing sustainability of ecovillages

Assessing the socio-ecological impacts of ecovillages is complex. Daly [1] highlights the ecological footprint (EF) and carbon footprint (CF) as the most commonly used indicators. EF combines various environmental impacts into a single metric for comparing sustainability across different contexts and time periods. It helps assess environmental pressures on consumers and communities, making it a useful tool for evaluating community-level sustainability [1], [24]. LCA methods can be used to develop comprehensive models for assessing the environmental impacts of ecovillages. Reconfiguring social practices to promote low-carbon habits is key [2]. It requires collective efforts to establish shared visions, decisions, and norms, as well as developing supportive technologies and infrastructure.

The assessment tools mentioned are mainly focused on the environmental aspect of ecovillage sustainability and are typically used in later stages of the design process. This highlights the need for frameworks that address the early stages. The social components of the Donut model and the ecological processes of the planetary boundaries framework can provide criteria for early assessments in the design process, aligning with the strong sustainability paradigm.

2.4. Sustainable value creation and capabilities approach

A key feature of ecovillages is their ability to harness local dynamics and collaborate with stakeholders to develop SV propositions [7], [8]. Value creation, traditionally linked to financial gain and business models, has expanded with the focus on social and environmental sustainability [25], [26]. Ecovillages use alternative approaches that emphasize external networks and cooperation, enhancing stakeholder capacities through co-design, co-production, and co-evaluation, and fostering shared knowledge and collective processes [27].

The value propositions of ecovillages are inherently linked to the sustainable transitions of their territories, as the latter are not neutral spaces for project development; they actively contribute resources and shape the development process [10], [11]. A territory is a sociocultural construct, continually shaped and renewed throughout history, where social, cultural, productive, and technological dynamics are formed [10], [11]. Understanding the value organizations create or destroy within the territories where they operate is crucial for designing and implementing local sustainability projects and for minimizing or avoiding negative externalities [12], [25], [28]. From a territorial perspective, SV creation is "a process in which organizations generate and transfer value (both material and immaterial), reducing and avoiding negative externalities for multiple stakeholders at multiple levels (organizational, network, and territorial)" [12, p. 84]. SV creation maximizes benefits and minimizes damages economically, socially, and environmentally, emphasizing its dynamic nature and need for adaptation in specific projects [28]. Destroyed value refers to harmful environmental and social impacts, while lost value pertains to missed opportunities where actors fail to utilize existing assets, resources, and capabilities [12].

Ecovillage interactions within their territories are complex and constantly evolving. Incorporating a territorial approach by identifying dynamics, resources, and actors promotes a systemic strategy in designing value propositions [9]. For ecovillages, this perspective will enable understanding of stakeholder relationships, better addressing local sustainability challenges, and creating SV within the territory [12]. Relevant research has developed tools like actor network mapping and the identification of territorial resources and internal capacities, particularly using a PSS approach, to support collaboration in designing territorial sustainability initiatives [10], [11]. Ecovillages utilize these resources and partnerships to create SV and reduce or avoid the negative externalities within their local contexts, highlighting the importance of the territorial perspective for managing and implementing successful projects.

3. Methods

3.1. Case selection

The study was part of two research projects. The Tech-0-Artif project aims to assess the impact of design and construction methods for zero-artificialization solutions while analyzing the creation of SV in local community projects. The D-TechnoSS project is focused on operationalizing the strong

sustainability paradigm. The literature identifies ecovillages as significant initiatives for addressing socio-ecological challenges at the local level. Due to its theoretical relevance [29], an ecovillage in an advanced stage of maturity provides a valuable field for empirical studies for both projects. L'Oasis du Coq à l'Âme in France is a community of 20 households (around 30 adults and 15 children) composed of citizens committed to an ecological transition project: to inhabit, live, and act in an eco-responsible manner within their territory and on the planet. The projects undertaken within this ecovillage, as well as its organizing committee, align with the paradigm of strong sustainability. The ecovillage has consolidated its presence and activities in the local territory, indicating an adequate level of maturity.

3.2. Data collection and analysis

Data were collected through two 3-hour co-creation workshops with around 12 ecovillage inhabitants, grouped by interests and responsibilities. The workshops followed the double diamond model [30], a consolidated co-creation model, adapted to map development stages, identifying actors, resources, capabilities, and strong sustainability concepts.

The objective of the first workshop was to understand the ecovillage ecosystem. The first step was to map the different actors and their relationships, focusing on their scale of involvement, particularly the exchanges of value. The social foundations and ecological ceilings of the Doughnut model served as the starting point for assessing the current sustainability situation of the ecovillage. This allowed for the identification of the ecovillage ecosystem's available capabilities, as well as the activities and values expressed by its inhabitants. These capabilities are directly linked to the sustainability maturity of the ecovillage. The second workshop facilitated the definition or formalization of a general objective for the ecovillage and the identification of guiding ideas along with associated capabilities and a SV proposition [10], [28]. Subsequently, ideas aligned with the elements of the Doughnut model were selected [16]. This process enabled the creation of a future vision for the ecovillage's sustainability, by integrating the selected ideas in the vision. At the end of each workshop, the data were synthesized to create a summary for the ecovillage. In the first workshop, groups compiled key observations, with territorial actor mapping based on Delgado Jaime's [12] model, focusing on value exchanges, activity sectors, and capital types. For the second workshop, a different approach was used. Participants were asked to identify, in detail, the capacities of the ecovillage that were the most relevant to be developed in order to move towards the defined objectives. To build the sustainability vision, stories from each working group were used to gather key concepts of strong sustainability, both explicitly chosen by the inhabitants and those implicitly part of their vision. A final list of all ideas was created to represent this collective vision.

4. Results

Building on the theoretical foundations from the literature review and empirical observations from the case study, a

conceptual framework is proposed to describe the co-creation of SV in ecovillage projects (Fig. 1). This framework outlines a co-creation process and is set in the early stages of sustainable project design. It is composed of three main steps. The first focuses on understanding the ecovillage ecosystem its actors, and capabilities. The second involves territorial analysis aimed at project generation with a potential integration of new local stakeholders. The third focuses on how SV propositions and narratives can be developed and translated into concrete plans to enhance projects aimed at community sustainability. The three stages and key elements are outlined below.

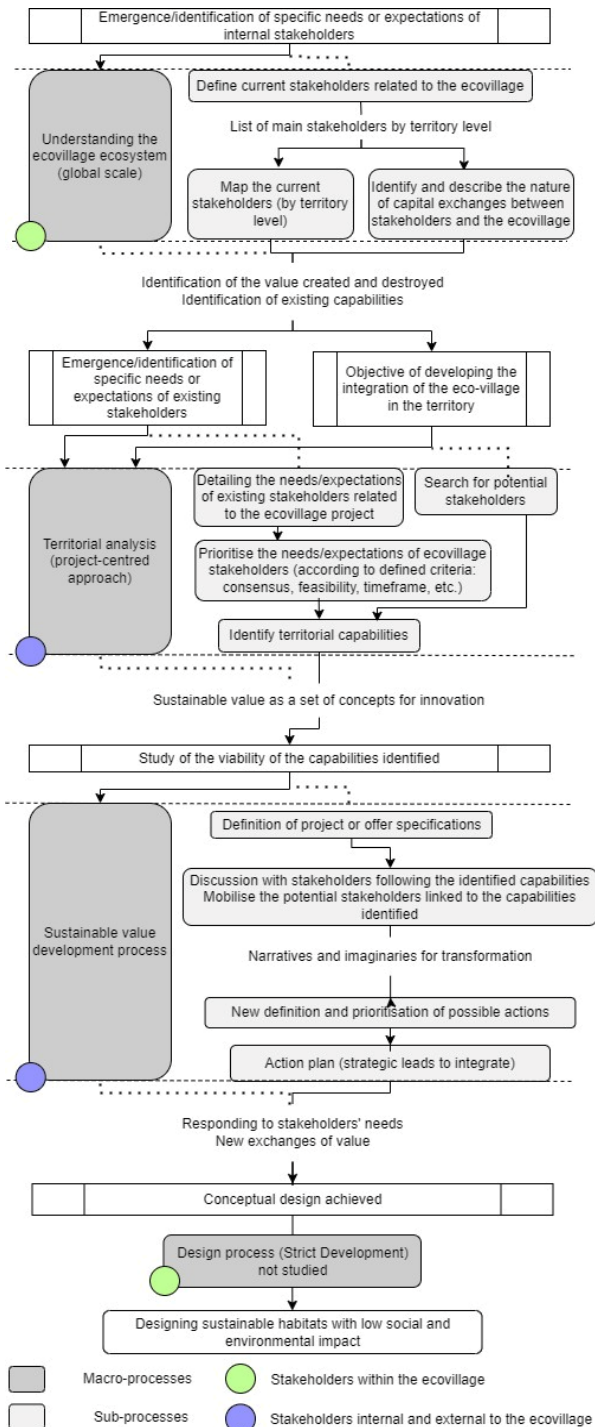


Fig. 1. Conceptual framework for understanding the capabilities and potential for sustainable value creation in an ecovillage (authors).

4.1. Co-creation as a process of sustainable value creation

The framework focuses on the early stages of the design process, which are crucial for project development. In the context of an ecovillage, the involvement of multiple actors is essential, making a co-creation approach highly relevant. Researchers and practitioners have argued that co-creation can have a positive long-term impact if implemented in the very early stages of a project [31]. Value co-creation occurs when various actors (customers, suppliers, partners, users, etc.) are involved in the dialogue, design, and development of a solution or in problem-solving [32]. It implies that stakeholders are actively engaged in the process, facilitating the generation of appropriate value representations and improving coordination between different actors [33]. The value an organization offers through co-creation relies on the knowledge, expertise, collaboration, and interactions of multiple stakeholders [28]. In communities, the true value of co-creation goes beyond any economic benefits it may offer [3]. It fosters emotional engagement and lasting alignment of goals and methods by involving individuals in achieving a shared outcome, especially in sustainable projects [34].

4.2. Understanding the ecosystem of an ecovillage

From a territorial perspective, creating SV is shaped by the benefits of local cooperation and synergy of actors to enhance ecological and social aspects of their ecosystem [10]. In the co-creation process, analyzing the ecosystem helps identify the actors, their influence, and the relationships within local networks and the ecovillage. These relationships can be examined from various perspectives: geographical (proximity), cultural (values, sustainability, solidarity), cognitive (openness to new ideas), structural (connectivity, trust), and political (power and influence) [10]. Understanding the ecovillage ecosystem helps identify strategically valuable resources within the network. Net-Map are useful for analyzing ecovillages' network positions and their relationships with local actors [10].

4.3. Territorial analysis

At the territorial level, understanding the ecovillage ecosystem (by mapping the network of stakeholders) helps identify key elements, particularly the resources and capabilities available for a specific innovation project [10]. The resource perspective is crucial for organizations to develop and implement innovations in collaboration with involved stakeholders [35]. Recognizing the types of resources that can be mobilized at different levels can enhance the creation of SV [10], [11]. The framework suggests analyzing resources at three levels: network resources (strategic assets for network members such as trust, culture, goals, business models, and reputation) [35]; territorial resources (specific to the geographic area, culture, history, and productive specialization, focusing on access rather than ownership) [10], [11]; and organizational resources (assets, capabilities, processes, organization, knowledge, and information controlled by the organization).

4.3.1.1. Sustainable value as a set of concepts for innovation.

The benefits to be maximized from SV depend on the vision of the ecovillage. The primary focus is on enhancing the social and environmental aspects of sustainability. The environmental value implies a low impact on the ecological systems where the project is located, this mainly includes the protection and regeneration of the local biosphere. Social value includes elements that the community considers valuable, such as well-being, happiness, and values, particularly the improvement of living conditions. Strong sustainability becomes relevant in this context, with the Doughnut model highlighting key areas for action. The benefits should also extend to the network of stakeholders, including visitors to the ecovillage. Field data identified four main concepts for creating this SV, as follows:

- *Product and infrastructure innovation*

This concept includes feasible changes in materials, energy, optimization, products, and infrastructure. In ecovillages, technical innovations may involve classic ecodesign strategies, such as using renewable resources or recyclable options. These innovations should adopt a frugal approach, emphasizing essential functions, optimization, performance, and durability.

- *Values model innovation*

Innovating by promoting values centered on reducing consumption and production is essential for strong sustainability. Ecovillage members stressed the importance of waste reduction and better management. They emphasized reducing production by using existing infrastructure, technology, and prioritizing on-site production to cut transport and packaging. For end users, evaluating essential needs and reducing consumption is also a valuable approach.

- *Organizational and social innovation*

One lever for social change is the inclusion of civil society in the solution development process. Co-design strategies can be employed to integrate users and partners at key stages, such as idea generation, production, and distribution. In an ecovillage, the community could coordinate collaboration networks based on equity and justice principles, while also promoting awareness and sustainable consumption behaviors alongside solution development

- *Territorial innovation*

It has been noted that the territory is a dynamic context. Solutions developed within the ecovillage should be considered from a scalability perspective, aiming to maximize their use among various stakeholders. This can be achieved by creating local loops for reuse and transforming waste into new products, thereby extending their life cycle. Approaches based on industrial and territorial ecology can be valuable for generating SV by incorporating local actors.

4.4. Sustainable value development process

Once the territorial analysis is completed, sustainable value is developed. At this stage, the innovation concepts will be distilled into a set of proposals for new value offerings. However, this process must be accompanied by in-depth discussions between the stakeholders and ecovillage members to generate the narratives and transformation imaginaries that will support these offerings

- *Narratives and imaginaries for transformation*

Community members' collective efforts and shared objectives can create strategies that drive future sustainability actions [20]. Ecovillages offer their members broad opportunities to participate in building a shared vision of practices and projects enabling social transformations. The creation of new sociotechnical imaginaries, has proven to be relevant for this purpose [36]. Sociotechnical imaginaries are “collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology” [37, p. 6]. Imaginaries can emerge from individuals or small communities and become dominant sociotechnical visions, connecting current practices with imagined desirable (sustainable) futures [38]. Co-creation generates imaginaries during initiative development, with sociotechnical imaginaries offering a detailed description of project objectives. These imaginaries are essential for crafting narratives that envision desirable futures and influence practices, strategic decision-making, and policy formulation [36], [38]. These narratives help communities rethink approaches, practices, technologies, organization, governance, goals, vision, skills, and evaluation methods [39].

4.4.1. Action plan and achieving conceptual design

The objective of the action plan is to develop the key concepts identified above, integrating them into a concrete project that aligns with the interests and needs of all stakeholders. The plan responds to the exchanges, discussions, and agreements that are consistent with the proposed narratives and transformation visions.

The action plan incorporates the value propositions and the exchange of new capabilities introduced by the new stakeholders joining the project or by the new needs of the ecovillage or the current stakeholders. It is intended that this plan will evolve into a conceptual design for a new offering to be implemented within the ecovillage, reflecting sustainable value. By implementing new actions in the ecosystem, the latter gets more exchanges of SV preventing value destruction and becomes more integrated in its territory.

5. Discussion

5.1. Theoretical implications

This research supports interdisciplinary studies highlighting the role of local initiatives in sustainable transitions. Few studies examine how territory, resources, and actor dynamics influence the SV propositions of ecovillages. Ecovillages, as complex ecosystems, require analysis from various perspectives. Our framework contributes to an exploratory understanding of the process to create SV. To achieve this, we integrated theoretical insights from the literature with the practical experience of an ecovillage that has successfully implemented high-value sustainability projects. A key contribution is emphasizing the co-creation process as central to community projects and the importance of analyzing key partners, resources, and internal capabilities. Ecovillages have

developed practices, structures, and operations aligned with the strong sustainability paradigm. Their projects rely on imaginaries and narratives essential for sustainable transformation. The framework focuses on creating narratives based on the strong sustainability paradigm (ensuring the fulfillment of basic human needs while respecting planetary boundaries). This framework promotes sustainable design and innovation at socio-spatial levels [9], encouraging the development and co-creation of global projects within a territory, rather than focusing solely on isolated technical solutions.

5.2. Practical implications

This framework can help local organizations, such as communities, associations, and ecovillages, to initially assess their innovation ecosystem by analyzing their network of actors, territorial resources, and internal capacities essential for co-creating SV projects. Researchers could use the framework to create exploratory tools, such as diagnostics or preliminary assessments, of early stages of a co-creation process. While based on the experience of a specific ecovillage, the framework can be adapted by other organizations to fit their unique contexts for co-creating SV.

6. Conclusions, limitations and perspectives

This article introduces a conceptual framework to better understand and harness the potential for creating SV in ecovillages. The framework proposes an iterative co-creation approach at its core, designed for implementation in the early stages of the design process. The framework presented is both descriptive and prescriptive. It first focuses on the territory, its network, and available resources. Next, it identifies innovative concepts related to SV. The framework also highlights the importance of creating imaginaries and narratives for future sustainability initiatives, culminating in an action plan (for conceptual design) that incorporates SV.

This study was limited to a single French ecovillage, findings are specific to its socio-economic and cultural context. Although not generalizable, it provides a foundation for working hypotheses for further research in other ecovillages [29]. The ecovillage is complex, making it difficult to capture all members' experiences. Participants highlighted the need for clearer concepts and more time for data collection. Future research could refine the framework and assess its practicality. Comparative studies could identify specific resources for strong sustainability in ecovillages and explore territorial influences. Analyzing the stages involved in the detailed design of SV creation is recommended. Ecovillages can model societal sustainability and inspire collaboration among communities, academia, and stakeholders to address socio-ecological challenges.

Acknowledgements

This research is part of the collaborative project D-TechnoSS, funded by French National Research Agency (ANR-20-CE10-0006). It is also a part of the multi-stakeholder

research program Tech-0-Artif, supported and funded by The French Agency for Ecological Transition (ADEME). We thank L'Oasis du Coq à l'Âme members for their participation in this study

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