

A paradigm shift from human-centred to life-centred design

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Abstract: Human-centred design (HCD) has gained significant popularity as an approach that prioritises the needs of humans in the design of products, services, and systems. This review paper discusses the HCD and examines the concerns associated with an overemphasis on human-centricity. It leads to the necessity of Life Centred Design (LCD) as a paradigm shift in highlighting the importance of a holistic perspective, ecological, social and economic sustainability. This paper suggests that Traditional Knowledge Systems may address the issues of HCD and present a holistic understanding of LCD. Any research pertaining to design in the future may integrate aspects of traditional knowledge so that the scholar understands the evolution of LCD as a historical construct.

Keywords: Human-Centred Design, Life-Centred Design, Traditional Knowledge systems.

1. Introduction

Since the beginning of the Industrial Revolution, advances in technology have altered how people and the environment interact. Modern existence is driven by technology. This has altered and impacted every industry over the past five decades. Technological advances have made it possible for the human to stretch the boundaries of possibilities (Jirotko & Stahl, 2020).

The field of design evolved in response to technological changes, adopting human-centred design as a framework to address the challenges people face when using interactive products or spaces. In order to put the user completely at the centre of the design process, human-centred methodologies and processes were adopted (Paulos, et al., 2008). Users' goals and the activities designed to help them achieve those goals became the main focus of a designer's job. The usefulness of a design solution to the person who would end up using it was used to assess its success (Kolko, 2011).

The design community has begun to question this apparent prioritisation of people and their aspirations over the past several years because of the detrimental impact to natural systems. Academics argue that explicit consideration of the well-being of the entire environment during the design process should complement the focus on the user or consumer that human-centred design relies on (Praskievicz., 2021). The interaction between user and designer becomes the most prioritised input for output product, but there are other parameters that need to be considered. Interaction based human centric design has a negative impact on global sustainable development goals as per various studies (Borthwick, Tomitsch, & Gaughwin, 2022). An inclusive approach is required for better resolution of these goals where non-human life cycles or ecosystems may be addressed with the help of a life centric approach.

- Is human centric design the answer to a holistic sustainable living?
- What are the key principles of life-centred design
- How Life centred design addresses ecological, social and economic aspects of design (from the perspective of a holistic built environment/settlement)
- How traditional Knowledge system (TKS) can address the issues of HCD and present a holistic approach towards Life centric design

The ensuing sections will give an insight about the human centred design as a process and concerns related to it. Further this paper argues the paradigm shift required to focus beyond just human needs and to encompass the broader context of all life on Earth, including ecosystems, biodiversity, and sustainability. It also suggests how TKS can address the issues of HCD and present a holistic approach towards Life centric design. The paper has drawn examples from the Design domain.

2. Human Centred Design and its impact

The term "universal design" or "human-centred design" was coined by Ronald Mays in the early 1980s in response to the development of environmental psychology in the 1970s. The terms "user-centred design (UCD)," "person-centred design," and "people-centred design" were all used to describe HCD. Human-Centred Design, is an approach to problem-solving and innovation that puts human needs, behaviours, and experiences at the forefront. It involves engaging with users throughout the design process, from understanding their needs and perspectives to testing and iterating on prototypes based on their feedback. HCD offers several advantages, including a user-centric approach, improved user satisfaction, higher adoption rates, fostering innovation, reduced risk of failure, cost-effectiveness, and ethical design practices. These benefits can lead to better-designed solutions that are more effective, user-friendly, and aligned with human needs and values (Maguire, 2001).

2.1 Human-centered design process

Designers' in-depth understanding of communities and users' needs helps them to provide creative solutions as well as develop and test concepts before making them available to the general public. Concrete and abstract thinking alternate between the three phases (inspiration, idea and implementation) of the HCD process (Giacomin, 2014). Designers need to understand people, see their lives and listen to their dreams in order to be inspired. Ideation requires designers to take all feedback into account, generate multiple concepts, and try alternative solutions.

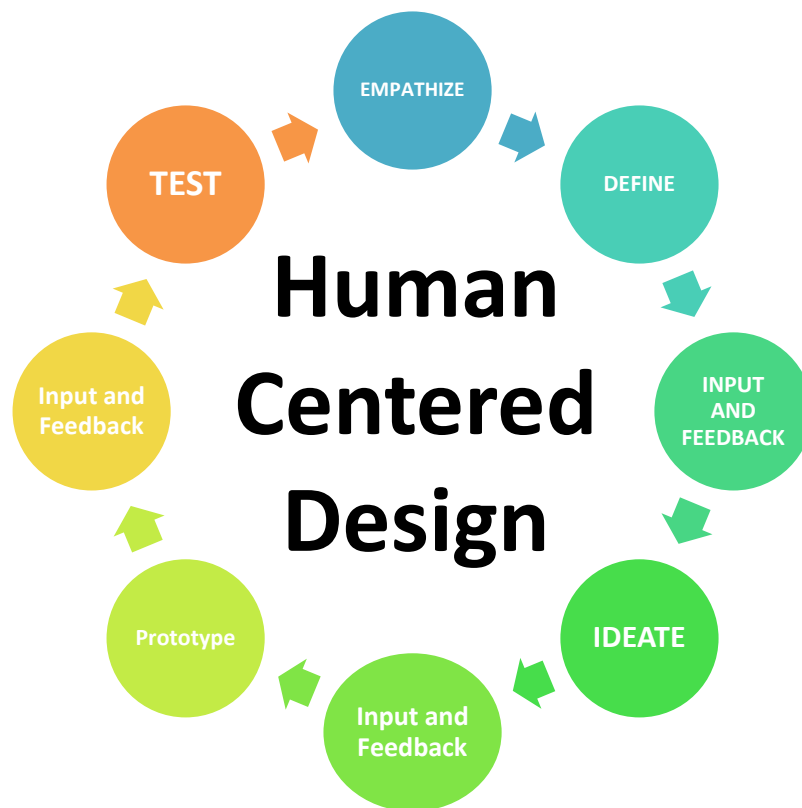


Figure 1 Human centred design process

Understanding user needs, behaviours, and motivations is the first step in the iterative process of human-centred design (HCD), which aims to create solutions that successfully address users' demands. The following phases make up the human-centred design process:

Empathise: By seeing and interacting with people, designers attempt to comprehend their requirements and difficulties throughout this phase. This aids designers in getting a thorough grasp of the context, actions, and motives of users.

Define: Designers specify the issue they're trying to tackle based on the understandings they got throughout the empathise stage. In order to do this, the information obtained during the empathise stage must be combined, and the problem must be framed in an approachable manner.

Input and feedback for ideation: There are many ways to offer input and feedback to aid in the development of concepts and the generation of ideas. Listed below are a few ideas:

Brainstorming sessions: Hold collective brainstorming meetings where everyone is encouraged to openly express their thoughts. Encourage discussion participants to build on one another's ideas and to postpone making judgements.

Mind mapping: Utilise tools for mind mapping to create and arrange thoughts. By doing so, you might find fresh chances and connections between ideas.

User feedback: Receive user feedback to determine their requirements and problem areas. Ideas may be developed using this feedback to solve problems faced by consumers and enhance their experience.

Competitor analysis: Conduct a competitive study to find out how other businesses or organisations are tackling comparable problems. This can assist in locating market gaps and chances for innovation. a competitive analysis to identify how other companies or

organisations are addressing similar challenges. This can help to identify gaps in the market and opportunities for innovation.

Inspirational sources: Move to other professions or sectors for ideas. This can aid in the generation of new concepts and the introduction of fresh viewpoints to the design problem.

Ideate: At this step, designers come up with a variety of concepts and options to solve the issue they identified in the preceding stage. This entails idea generation, concept sketching, and idea prototyping.

Input feedback for Prototype: In order to make sure the final product or solution fits the demands of the user, input and feedback from users are required throughout the prototype stage of the human-centric design process. Here are some suggestions for comments and suggestions during the prototype phase:

Usability testing: Usability evaluation to gain input on the functionality, usability, and general user experience of the prototype, do usability testing with actual users. In order to pinpoint areas that require improvement, ask users to complete tasks using the prototype while you watch their interactions.

User feedback: Receive user comments on the prototype's attributes, appearance, and general idea. The prototype may be improved using this input to make sure it satisfies the needs and preferences of consumers.

Expert reviews: Consult with subject-matter specialists, such as designers, engineers, or usability experts, for their opinions. Their knowledge may be used to find possible problems and chances for improvement.

Iterative design: Modify the prototype repeatedly based on the input you obtained from testing and feedback. Every iteration should seek to fix any problems or difficulties brought up during earlier feedback cycles.

Quantitative analysis: Analyse quantitative data to find areas of the prototype that can benefit from improvement. Examples include metrics on user engagement or task completion rates.

Prototype: Designers develop a physical prototype of their concepts at this stage. This might be a high-fidelity prototype, like a 3D-printed model or a computer simulation, or a low-fidelity prototype, like a sketch or a paper model.

Input feedback for Testing: To improve the solution and make sure it satisfies the user's needs, input and feedback are required throughout the testing phase of the human-centric design process. Input and feedback can be given in the following ways during the testing phase:

User feedback: Get user reviews about their impressions of the finished product or solution. The design may be further improved by using this input to spot any unresolved usability difficulties.

Bucket testing: Use bucket testing to assess how well various iterations of the solution work. This can assist in determining which functions or design components best satisfy user demands.

Analytics: Gather user information and analytics and analyse it to learn how people are interacting with the solution. This can assist in locating potential areas for additional optimisation or refining of the solution.

Expert reviews: Consult with specialists in the area for their opinions in order to identify any difficulties that still exist with the solution and to offer recommendations for enhancement.

Iterative design: Modify the solution over time using the input that was obtained from testing and feedback. Every iteration should seek to fix any problems or difficulties brought up during earlier feedback cycles.

Test: At this step, designers do user tests on the prototypes to get input and improve their concepts. This aids designers in making sure their ideas are practical and satisfy user demands.

2.2 Is Human centric design answer to holistic sustainable living

Human-centric design primarily focuses on designing solutions that meet the needs, behaviours, and preferences of humans. While it can contribute to sustainable living by considering human factors, it may not inherently address the needs of non-human beings or the natural environment. Achieving holistic sustainable living requires considering the well-being of all living beings and the broader ecosystem. While human-centric design can have many benefits, there are also some potential concerns (Harper, Rodden, & Rogers, 2020). Some of them are listed below:

Environmental concerns:

Waste: Certain human-centred design elements could produce more waste or add to current waste streams. For instance, the usage of throwaway items or materials, such single-use cups or packaging, can increase waste in a design.

Transportation: Design elements that call for specific items or materials may need to be transported across great distances, which can increase transportation-related carbon emissions.

Ecological impact: Human-centric design elements may have a bigger ecological impact than more conventional ones, particularly if they need specific materials or goods that are not supplied sustainably.

Energy Consumption: A human-centred design can consume a lot of energy, especially if it uses a lot of electronics, lighting, or HVAC systems. This can lead to increased carbon emissions and other environmental consequences of energy use.

Emissions: When certain products, services or technologies are required during design, the air, water or land may be contaminated. For example, the use of certain paints, varnishes or adhesives may result in the emission of volatile organic compounds (VOCs) into the environment.

Material use: Human-centred design features may require the use of particular goods or materials that are not sustainably produced or that have a large negative impact on the environment. For example, the manufacture of some high-tech materials may require significant energy or resource investments.

Natural resource Consumption: Water used as an element in design, i.e. using natural elements in a design, such as indoor gardens or living walls, can significantly reduce the amount of water used. This could worsen the issue of water scarcity or have other water-related environmental consequences. Land use and landcover used as elements to a design, such as indoor green roofs and vegetation may require more land use or promote urban expansion. Use and pattern of land cover should be planned as per function of land use to minimise negative environmental Impact.

Social concerns:

Exclusion: Certain categories of persons, such as the elderly, persons with disabilities, or those with restricted mobility, may be inadvertently excluded by human-centred design. Some individuals may experience barriers to participation and participation if design elements are not inclusive or accessible.

Privacy: Some human-centred design elements, such as open floor layouts or large windows, may impair privacy and make some individuals feel unsafe or uncomfortable.

Control: By planning a space keeping in mind the needs of people, it may be possible to monitor or manage how they behave or use it. In this case people may feel uncomfortable or distrustful if they feel that their autonomy or privacy is at risk.

Stereotyping: Human-centred design may be based on assumptions or prejudices about the desires or preferences of individuals. As a result, design options may be selected without taking into account the unique needs and preferences of different people and groups.

Insensitivity to other cultures and communities: Human-centred design elements that are strongly influenced by a particular cultural or social context may not be appropriate or sensitive to other cultures and communities. For people of diverse cultural origins, this can make them feel uncomfortable or excluded.

Restricted applicability: Some human-centred design elements may only be appropriate in particular contexts or environments. For example, adding natural features would not be possible in that area.

Economic concerns:

Cost: Implementing human-centred design elements can be costly, especially if it requires specific equipment, materials, or technology. They may be unavailable as a result of particular people or groups.

Maintenance: Compared to traditional designs, human-centred design elements may require more maintenance. For example, if any product is designed for annual repairs, necessity is not a sustainable solution.

Replacement: As they may become outdated more quickly than traditional designs, human-centred design components that rely heavily on technology or other high-tech materials may need to be replaced. This can increase the overall cost of the design.

Training: To operate human-centred design facilities that rely on specialised machinery or technology, users or maintenance people may need additional training. This can ultimately increase the cost of a design.

Accessibility: Human-centred design elements that are exclusive or inaccessible can increase the cost of remodelling or redesigning a space to make it more accessible.

Limited perspective, short term thinking, irrelevant solutions and lack of considering all, points out that HCD does not provide a solution towards holistic sustainable living. For considering a holistic living environment designers should consider design beyond HCD.

3. A revised Approach: -Life centred design

While Human-Centred Design (HCD) has been a widely adopted approach to design, there is growing recognition that it may not fully address the complexity and interconnectedness of the challenges facing humanity and the planet. Life-Centric Design (LCD) is a paradigm shift that expands the focus beyond just human needs to encompass the broader context of all life on Earth, including ecosystems, biodiversity, and sustainability

In the field of architecture life-centred design, also known as bio-centred design, is a method of creating spaces and structures for people that takes into account the wellbeing of the occupants as well as the environment in which they live. This design idea draws inspiration from nature and blends

elements of the natural world, such as light, plants, water and natural materials, into interior spaces for humans (Borthwick, Tomitsch, & Gaughwin, 2022).

Life-centred design aims to provide an environment that supports human health and well-being, fosters creativity and productivity, reduces stress, and encourages sustainable living. It highlights the bond between people and the environment and acknowledges how closely the natural world is linked to both our physical and emotional well-being. In addition to creating spaces that are visually beautiful and enjoyable, life-centred design seeks to create environments that are supportive of overall health, happiness, and sustainability.

Life Centred design process is addition of non-human stakeholders, their impact analysis and inclusive solution into the HCD process.

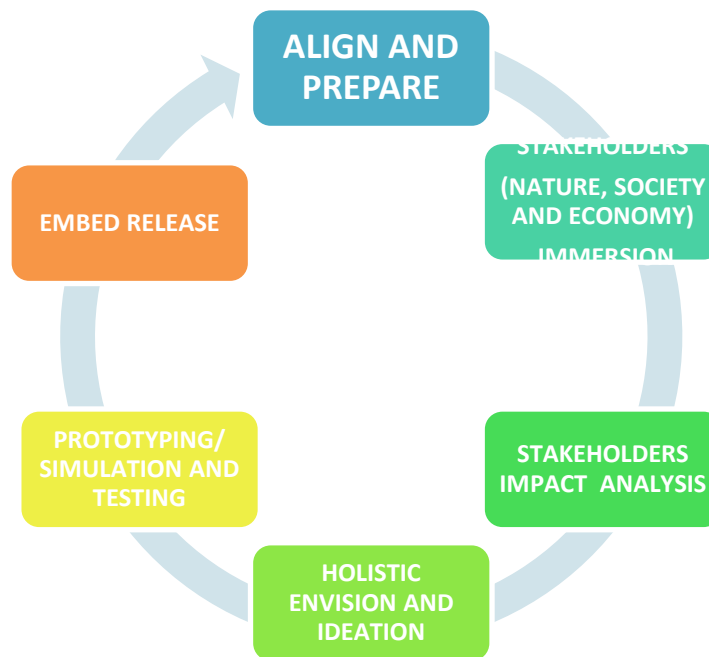


Figure 2 Life centric Design Process

3.1 Key principles of life-centric design:

The key principles of LCD include integrity, adequacy and opportunity, equity, efficiency, democracy, and civility, prudence and integration.

Integrity, the first guiding principle, acknowledges "the interdependence between human systems and natural systems and to preserve the integrity of these irreplaceable bio-physical systems". Interface designers can take advantage of the notion of donut economics, which is employed by, for example, urban planners, legislators, and civil societies, to put this principle into practice (Leit~ao, 2000).

The second principle, **Adequacy and Opportunity**, "guarantees an appropriate standard of living for all, with possibilities to raise this standard of living without sacrificing future generations." The first component of this concept is closely related to human-centred design, especially when it is complemented with pluralistic design as a strategy to support the development of diverse worlds and take those into account. Stocks that can be driven to the "margins" through colonisation. Interaction designers can use cathedral thinking, which is founded on the fact that architects planning mediaeval cathedrals had to do so knowing that they would not live to see their work completed, to address another part of the complex (Gibson, 2001).

The third principle of **equality** is to "reduce dangerous social inequalities in adequacy and opportunity in the components of health, security, social recognition and political power between the rich and the poor." Social justice methodology, which invokes conflict, engagement, and politics as a means of achieving socially acceptable outcomes, can be used by interface designers to put this idea into practice (Gibson, 2001).

A fourth principle of **efficiency** is that it reduces "demands for energy, materials and other pressures on socio-ecological systems". According to studies conducted under the general theme of "sustainable human-computer interaction", there are many ways that human-centred design can be used to reduce energy and material use in and through design. The circular economy can be used as a framework for putting this notion into practice as it aims to "eliminate waste through improved design of materials, products, systems, and within this, business models." It "replaces the use of fossil fuels" and "moves toward the use of renewable energy." It replaces the idea of "end of life" with restoration (Gibson, 2001).

Democracy and civility, the fifth principle, promotes "rights, markets, customary and the opportunity to better inform individual organisations" through the incorporation of sustainability themes into decision-making. One important approach that is growing out of the concepts of democracy and civility is to provide customers and users with the information they need to make better decisions (Gibson, 2001).

The sixth principle, **prudence and precaution**, acknowledges uncertainty by managing to adapt and reduce risks that could potentially cause permanent damage to complex and poorly understood systems. Interaction designers can use systems thinking as a method to identify poorly understood risks that are hidden inside complex systems (Gibson, 2001).

Immediate and long-term integration, the seventh principle, acknowledges interdependence "by employing several sustainable-minded principles together to uncover and explore areas of potential mutual benefit." Application of this idea to interface design could improve the practice of life-centred design using the bio-zoning paradigm, which recognizes biodiversity as a key marker of urban health (Gibson, 2001).

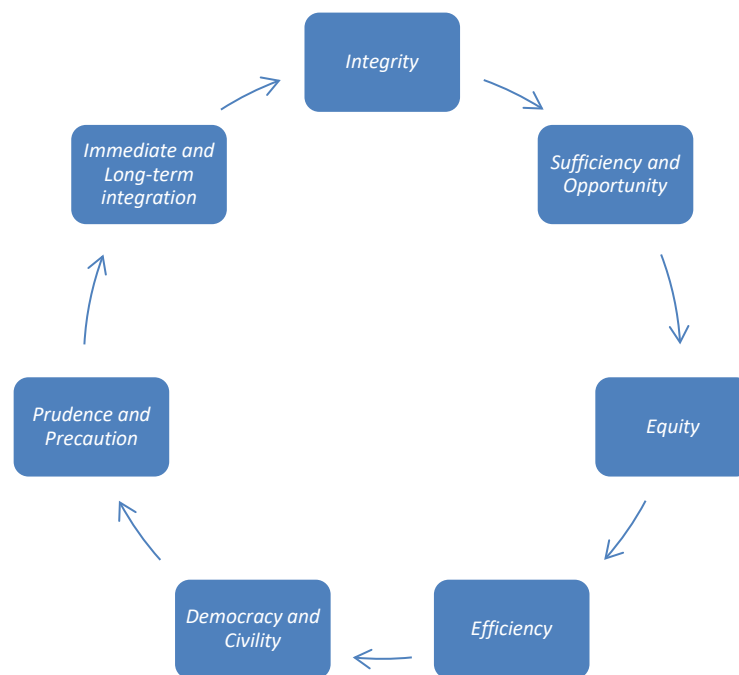


Figure 3 LCD Principles

For inclusion of these principles, we have to add more stakeholders in human centric design parameters

3.2 Inclusion of non-human stakeholders

We may include the following parameters to human centred design for better solution (Tomlinson, Nardi, Stokols, & Raturi, 2021).

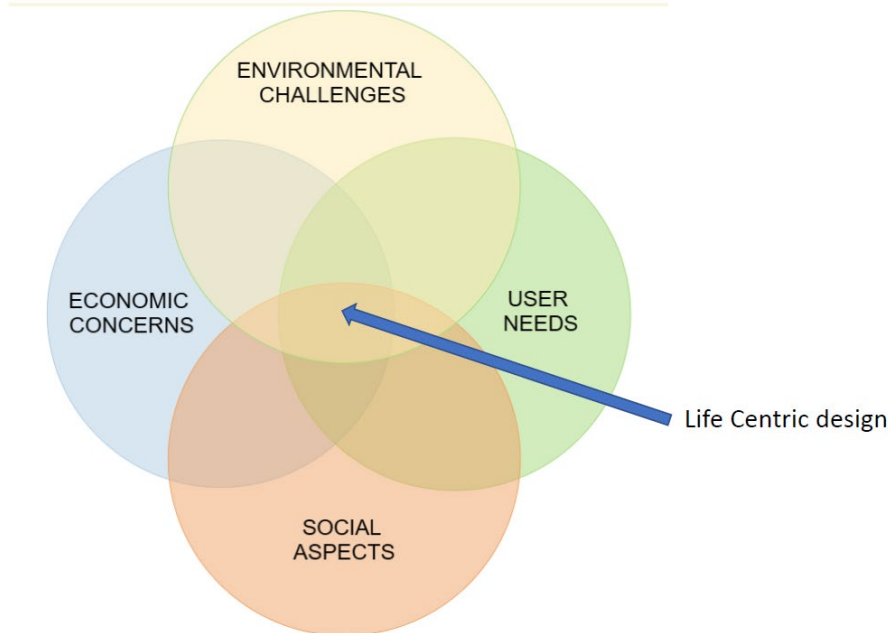


Figure 4 Life centric design stakeholders

Environment

Life-centred design includes environmental factors as a key component. In reality, life-centred design focuses heavily on developing areas and buildings that are eco-friendly and sustainable.

Incorporating water-efficient fixtures and appliances, employing renewable energy sources such as solar panels, and planning buildings with natural ventilation and lighting are just a few examples. The use of sustainable and low-carbon-footprint materials, such as recycled and repurposed materials, is also encouraged by the life-centred design.

By creating structures and areas that can be easily taken apart and reused after their useful life, life-centred design also aims to reduce waste and pollution. The "cradle-to-cradle" strategy aims to establish a closed-loop system that minimises waste and conserves resources.

Life-centred design understands that sustainable design is essential to the well-being of both people and the natural world, and that environmental considerations are an integral aspect of that design. By giving the environment first priority when making design choices, we can design environments and buildings that are good for the earth as well as us.

Society

Through life-centred design, social stakes in the built environment are addressed. People's health and well-being as individuals and as a community can be profoundly affected by the design of our homes, places of employment and public spaces.

With the social aspects in mind, it can be easy to create an environment that is welcoming, accessible and supportive of all people. For example, a life-centred design includes features such as ramps, elevators, and accessible restrooms to ensure that people with disabilities can move and use the facility comfortably.

Community gatherings, shared public spaces, and adaptable workspaces that encourage collaboration and creativity are just a few examples of features that can be incorporated into life-centred design to promote social connection and well-being. These characteristics can foster a sense of belonging and community, which is important for both individual and social well-being.

life-centred design acknowledges that our mental and emotional health is significantly affected by the built environment. Designing spaces with aesthetics and comfort in mind can help people feel less stressed and anxious and lead better lives overall.

Economics

Another important factor in life-centred design is the financial aspect. According to life-centred design, the built environment can have a considerable financial impact, both in terms of initial fabrication costs and ongoing maintenance and operation.

Using sustainable technology and methods that can reduce long-term expenses is one way life-centred design tackles the economic issue. For example, incorporating energy-efficient components into building design can ultimately save on electricity expenditure and maintenance expenditure.

By using sustainable resources and manufacturing techniques, life-centred design can contribute to the development of new business possibilities. This can include using recycled and salvaged materials and purchasing from regional vendors, which can boost regional economies and reduce the environmental impact of construction (Sayad, Farghaly T, & Hamada, 2017).

In addition, life-centred design emphasises the need for developing products that adapt to shifting needs and usability throughout time.

4. Indian knowledge systems and holistic way of life

In traditional knowledge systems in the Indian sub-continent, humans are an integral part of the natural environment along with flora, fauna and ecological features in contrast with Western philosophical models that place the human in the centre of the ecosystem allowing nature to be controlled for the comfort of the human. This idea forms the basis of human centred design leading to the ignorance of the natural framework supporting the human in interacting with their surroundings.

Ancient literary treatises set out detailed and complex requirements to shape the artificial environment - buildings, settlements, ornamentation, iconography, painting, sculpture, mechanical objects, products and other artefacts that allow humans to function. The critical point to note is that humanity is to navigate and negotiate with nature as opposed to master and control it, as is pointed out repeatedly in ancient knowledge systems. A narrative to understand this is based on the humanoid king, Prithu aggressively chasing a cow, Prithvi, which is actually the animal form of the earth to catch and subdue her in submission (a gender biased narrative rooted in cultural conditioning that this paper disagrees with but analyses for relevance). Prithvi runs to Brahma, the celestial Creator and explains her plight. Brahma summons Prithu and admonishes him for his careless pursuit of Prithvi and counsels him to ask her nicely and she will be happy to oblige. This may be interpreted today as the

human, especially in a powerful hierarchy, should live with the Earth and “she” will happily allow us to live with her.



Figure 5 Prithu chasing Prithvi (Image source: <https://mythgyaan.com/king-prithu-chased-earth-goddess/>)

Therefore, it is submitted that if LCD is incorporated into the design processes for shaping our artificial environment, human centred design may be enhanced. Looking ahead, with the advent of AI and the Metaverse, the role of the human in the design process is undergoing a transformation and climate change is forcing our relocation to a part of a network of nuanced collaboration with our ecosystem.

5. Exclusion

There are a lot of exclusions which are not covered in this paper, deep details of added stakeholders and their sub criteria are not discussed. It is very difficult to provide equivalent weightage to all stakeholders. We have to prioritise these parameters according to project attributes. Rubric for prioritising parameters based on statistical analysis is another subject of research. We have discussed a connection between the Indian knowledge system and LCD. Detailing of ancient Indian design concepts of different eras have been excluded in the discussion.

6. Conclusion

HCD is contested by the concepts of climate change and AI where engagement with “non-human” stakeholders is slated to become an integral part of the design ethos. This leads to the idea of LCD which looks at the human being in their environments. There is evidence of life centred design in the Traditional knowledge system and philosophy which by definition is holistic and human centred leading to living in harmony with nature. The way ahead of design research rests on a critical balance maintained between humans and their environments, both natural and artificial.

7. References

- Borthwick, M., Tomitsch, M., & Gaughwin, M. (2022). From human-centred to life-centred design: Considering environmental and ethical concerns in the design of interactive products. *Journal of Responsible Technology*.
- Giacomin, J. (2014). What is human centred design? *The Design Journal*, vol. 17, no. 4, pp. 606-623.
- Gibson, R. (2001). *Specification of sustainability-based environmental assessment decision criteria and implications for determining 'significance' in environmental assessment*. University of British Columbia.
- Harper, R., Rodden, T., & Rogers, Y. (2020). *Being Human: Human Computer Interaction*.
- Jirotko, M., & Stahl, B. (2020). The need for responsible technology. *Journal of Responsible Technology*.
- Kolko, J. (2011). *Thoughts on interaction design*. San Francisco, CA, United States:: Elsevier Inc.
- Leitão, R. (2000). Pluriversal design and desire-based design: Desire as the impulse for human flourishing. *Designing a world of many centers*. Design Research Society.
- Maguire, M. (2001). Methods to support human-centred design. *International Journal of Human-Computer Studies*.
- Paulos, E., Foth, M., Satchell, C., Kim, Y., Dourish, D., & Choi, H. (2008). Ubiquitous sustainability: Citizen science and activism.
- Praskievicz, S. (2021). How the environment became global. *Anthropocene*.
- Sayad, Z., Farghaly T, & Hamada, S. (2017). Integrating human-centred design methods in early design stage: using interactive architecture as a tool. *Journal Of Al Azhar University Engineering Sector*.
- Tomlinson, B., Nardi, B., Stokols, D., & Raturi, A. (2021). Ecosystems: Representing ecosystem impacts in design. *2021 CHI conference on human factors in computing systems*, (pp. 1-10).

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