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Considering the Human-Dimension to Make Sustainable Transitions Actionable

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Abstract: Sustainable innovation and transitions are increasingly gaining traction within academia, industries, and policymakers. Despite the research efforts, sustaining innovation and operationalizing transitions still remains a barely explored field. The pragmatic step from understanding towards doing is often not made explicit in the literature. In fact, it results in an unclear and vague grip on how to operationalize these understandings, or differently put on how to make this understanding pragmatic. In the current article, we conducted an integrative literature review using human-centeredness lenses that informs the so-called 'Human-Dimension' framework. We argue that adding the Human-Dimension to the existing models for analysis, such as the Multi-Level Perspective framework, might clarify the different meanings that emerge within the network of actors in a transition, and knowing how to translate those individual meanings towards a collective construction of meaning might be enabled. To illustrate the framework's contribution, we applied it to the context of a local sustainable development project. The results show how human-centeredness could serve as a domain to make the Human-Dimension of sustainable transitions actionable.

Keywords: human-centeredness; human-dimension; multi-level perspective; actionable; sustainable innovation; sustainable transitions

1. Introduction

The debate on the critical need to act on man's activities that severely impact our world has been in place for approximately two decades [1]. Environmental problems such as climate change, loss of biodiversity, and resource depletion comprise of grand societal challenges that surpass environmental problems [2–4]. Consequently, innovation to improve sustainability has gained recognition as an area of study priority [5,6]. Businesses and industries had embraced the long-term benefits of this type of innovation as a way to create competitive-advantage [7], rewarded with growth, profits, and access to new markets [8,9]. However, understanding the processes involving the societal adoption and retention of this kind of innovation has also brought the emergence of other fields of studies such as sustainability transitions [3,10–14].

The leading scholars in this field are united in the Sustainability Transition Research Network (STRN) [15]. Their approach towards sustainable transitions considers socio-technical systems' changes to be inherently multi-dimensional, highly complex, highly uncertain, open-ended, inherently normative, multi-actor, and co-evolving processes with long-term time-frames [3,16,17]. Recognizing these characteristics is essential to take a systemic perspective that allows new radical shifts in current socio-technical systems and understand the more sustainable ones [3]. One of the most referred frameworks to analyze those characteristics is the Multi-Level Perspective (MLP) by Geels [18]. It is a conceptual model explaining an analytical and heuristic concept to understand better the complex dynamics in sustainable transitions [18–20]. The model distinguishes three dimensions of sustainable

transition: niche innovations, socio-technical regime, and socio-technical landscape [19]. In the model, niches are considered as incubation rooms filled with radical novelties nested in the regime. The regime is referred to as the rules that enable and constrain activities within communities, and the landscape constitutes out of deeply structured trends in which a technological trajectory is taking place [16]. These levels are, in turn, interconnected and interdependent.

According to the MLP model, the study of the different contextual characteristics in each of the three levels, combined, might enable a pathway for sustainable transitions to happen [21]. The MLP analysis framework has laid foundations for much of the academic work done around socio-technical sustainable transitions [18–26]. Based on the multi-level conceptualization, another relevant framework developed to analyze socio-technical sustainable transitions is the Strategic Niche Management (SNM), which can be used to review and analyze the development of innovative technologies in niches [27].

These perspectives, managerial models, and characteristics proposed by sustainable transition scholars tell us something about the characteristics of transitions, behavior, context, and possible perspectives and approaches [3,18,24]. Hence, these are somewhat useful as starting points; it has been questioned how to make a more practical impact to "engage with real-world actors, systems and transitions" [3]. There is a gap in acknowledging how to go from conceptual transition research towards a more implementable and actionable approach [3,21]. In other words, there seems to be a disconnection between the world as we live it and the world as has been studied [28]. Due to this gap, in recent years, scholars in the field have focused on different perspectives of transitions to achieve more actionable guidelines by searching for strategies to anchor or link niches into the regime [24,29–31].

One of the main acknowledged characteristics of transitions in the current approaches is recognizing that if well, the processes can converge in different levels, creating windows of opportunity for change, actors always need to make the actual linkages [3,24,30,32,33]. Within research, those actors are not considered individuals but "groups of individuals with distinct motives, interests, knowledge, and power" [34] (p. 63). It is then required to explore more actor-related patterns focused approaches [35] and the individual perspectives that converge to acknowledge the differences occurring within those groups, to make those linkages effective. Scholars had pointed out that considering the transition's human-scale is critical to make them more actionable and, therefore, operational [3,17,36–41].

In the current article, we argue that adding a human-centered focus to the existing frameworks and approaches towards sustainable transition might benefit the creation of linkages between the emerging network of actors in transitions, that would give a more actionable and operational outlook. Our premise is that exploring the use of human-centered lenses will make it possible to advise specific activities, strategies, and mindsets that need to be in place for sustainable transitions to happen. Following an overview of our methodological approach, we analyze existing gaps referring to the human-scale or individual characteristics of the emerging linkages in the network of actors in the currently available literature on socio-technical sustainable transitions studies. We argue that to lower the abstractness of the current state of the art in sustainable transitions, adding human-centered lenses to the analysis might clarify the pathways for action and give a more tangible perspective on sustainable transitions. In keeping with Köhler and colleagues [3] as well as the STRN work [15], we performed an integrative literature review in search of the human-scale characteristics to construct a conceptual Human-Dimension framework to analyze transitions. To illustrate the benefits of considering this dimension in the analysis, we used the city-making sustainable development in the Dutch city of Delft as an illustrative example of an ongoing sustainable transition. First, we analyzed the sustainable transition scenario by using the MLP framework and adding the Human-Dimension analysis, respectively. Finally, we discuss our findings and the benefits of using human-centered lenses, as well as the implications of considering the Human-Dimension in socio-technical sustainable transitions.

2. Materials and Methods

The current conceptual work aims to provide theoretical and practical insights into how a human-centered perspective might contribute to the emergence of a more actionable and operational approach towards socio-technical sustainable transitions. In order to give an overview of the knowledge base, reconceptualize, and expand the current discussion about the human side of sustainable transitions, an integrative literature review was performed [42]. This approach promotes assessment, critique, and synthesis of the broad range of existing studies to emerge new perspectives [42,43]. We critically review each of the nine proposed themes in the research agenda for sustainability transitions [3] by adding the human-centered lenses, or in other words by focusing on the 'human-scale' or individual characteristics of socio-technical sustainable transitions and taking a broader stand by looking for references that differed from those mentioned by the transition scholars. We looked for gaps referring to 'actors,' 'micro-scale,' 'linkages,' or any other concept that could indicate a human or individual scale during our analysis. The resulting analysis is expressed in a theoretical framework, which by adding human-centered theory, could serve as a new perspective to analyze socio-technical sustainable research. We refer to it as the Human-Dimension framework.

To illustrate the value of adding the Human-Dimension to the sustainable transition analysis, we made use of a current sustainable transition project 'in-the-making' as literature suggested [12,33]. This specific characteristic would allow to make connections that reveal the current Human-Dimension characteristics of the project. The chosen project is a local sustainable transition plan that proposes to develop an area of the city by integrating circularity as the main goal. The plan is aligned to sustainability agreements made on a local level [44] as well as fitting to the United Nations (UN) Sustainable Development Goals (SDGs) [45]. The selected project is entitled 'Delft city development plan of Schieoevers Noord' and has the ambitions to accelerate the transition to a circular economy and achieve a sustainable society in the province of Zuid-Holland, especially the Metropole Region Rotterdam—The Hague (MRDH Region). To understand that context, we used the MLP model [18] to analyze the collected material, which consisted of academic studies, government available documentation, cross-media available evidence, and observations in the context. The resulting analysis would serve as guidance to select the actors that would be more important to focus on, considering the actual niche and regime dynamics within this specific sustainability transition.

By following a key informants sampling strategy [46], we conducted 18 open-ended and semi-structured interviews with actors representing five different groups: Government, Academy, Industry (Area Developers), Businesses (SME), and Citizens. The collected interview material was the primary source to understand the Human-Dimension within this specific sustainable transition context. The interviews were transcribed, and then an initial coding was performed, focusing only on the information that could mean an individual perspective on the transition process. Next, to analyze the data, the open codes and original quotes were printed and clustered in an iterative session. Then, guided by the proposed Human-Dimension conceptual framework, an interpretative phenomenological analysis (IPA) was performed [47]. The goal was to observe the relations across regimes and niches to define how the Human-Dimension could help operationalize transitions. The analysis served to reveal possible new connections within the sustainable transition and windows of opportunity for operationalizing the transition. Finally, we discuss the opportunities a human-centered perspective brings to socio-technical sustainable transition research.

3. In Search of the Human-Dimension in Socio-Technical Sustainable Transition Research

Until this point, the developed research around socio-technical sustainable transitions has provided essential insights into understanding the characteristics of transitions, behavior, context, and possible perspectives and approaches [3,19,25], both on 'macro' level and 'micro' level dimensions. However, in recent years, the scholarly debate has focused on requiring actionable approaches since the existing ones are observed as a dichotomy where changes are considered reciprocal [41] and not dynamic as they actually are. Scholars have highlighted the relevance of considering a more integrative

approach [3,41], which allows the treatment of social and environmental complex problems, with the required urgency [48]. In those lines, one of the aspects recently recognized by the research community is the relevance to link the macro-perspectives with the micro-perspectives and the emerging linkages between the different recognized dimensions [3,24,30,32,33] with a more tangible approach that gives a clearer meaning. Then, it seems relevant to give more attention to an individual level, in order to better understand those dynamics.

As previously mentioned, STRN is an established and recognized research community, well-aligned with the emerging research challenges, and elaborated an extensive research agenda aiming to summarize the current research directions and approaches concerning this area of knowledge [3], as well as the gaps and future directions. These characteristics would indicate the research's transdisciplinary nature by considering the already mentioned transition characteristics as selection criteria for the reviewed material. The review started with the nine themes proposed in the research agenda for sustainability transitions [3] that address different aspects of transitions or transitions research and then adding the human-centered lenses by deliberately looking for broader references than the already mentioned by transitions scholars. We reviewed what they mention as the existing research gaps critically, but focusing only on the characteristics of transition would refer to the actors' individuality involved in transitions and their dynamics. The related work highlighted the located gaps related to the human-scale or individual aspect of transitions. Table 1 shows these gaps found in the respective themes of the literature through human-centered lenses. In the remainder of this section, the human-centered gaps found in the nine transitions themes are elaborated upon below.

Table 1. Human-centered gaps found in the nine agreed upon transition themes.

Theme [3]	Gap
Current analysis approaches	Shared characteristics/needs between individuals either in, or across, regime and/or niches.
Power, agency, and politics	Individual perception (of one-self and others) of power and agency. How it affects conflict and contestation.
Governing transitions	Within a plurality of actors, who are intermediaries, and what they need during the implementation of policies.
Civil Society, Culture, and Social Movements	How culture affects individual decisions and how it permeates groups.
Transitions in Practice and Everyday life	Contextual, Social and Self-organizing factors, affecting the change of individual mindset.
Geography of transitions	Emerging relations and how they benefit or affect transition maintenance.
Ethical Aspects	Marginalized groups experiences in transitions.
Businesses and industries	Organizational innovation affecting roles and agencies of individuals.
Research Methodologies	Human dimension in action, at a micro-social dynamic, and as connection.

3.1. Current Analysis Approaches

Geels and Schot [27] discuss four typologies of socio-technical transition pathways. In essence, it is the understanding that incumbent actors can change their minds or opinion due to, for instance, losing their faith in the current regime [20,23]. In that case, the regime offers capacity for niches to transition. Then, the regime is the proactive actor for transitions to happen as opposed to niches pushing that transition. What we can learn from these typologies is that there seems to be a shared characteristic in actors that makes them susceptible to transition(s), either in regimes or niches [49,50]. A human-centered perspective would add that it is important to understand how and why the alignment between individuals emerges inside the niches, the regimes or niche and regimes, as they

might accelerate transitions [38]. This can be elaborated, for example, by studying the roles of particular actors as users [51], civil society actors [52], cultural discourses [49], and firms [40] to then understand their relations and shared characteristics that affect the multi-actor dynamics.

3.2. Power, Agency, and Politics

The process of transitions can be looked at from a political, power, and agency point of view. Differently put, this means that "who gets what, when and how" or the power relations [3,53] will affect "the capacity of individuals to make their own free choices" [36] or their agency to act. The most important aspect in that sense, is the need to "acknowledge, accept and deal with conflict and contestation" to address transitions in multi-actor dynamics environments [54]. From a human-centered perspective, this means that to understand how the power relations affect the agency of individuals is key to acknowledging how they ultimately deal with conflict. Furthermore, this relation will also affect the capacity of individuals for contestation [55,56]. Exploring the individual dimension at this point becomes relevant since conflicts at an implementable level are embodied by people who interact with each-others [36,57]. In other words, it shows that this understanding is key, and might unveil important barriers and/or opportunities to drive transition.

3.3. Governing Transitions

Governance takes at its heart the involvement of the plurality of actors and not solely governs it by a top-down approach. In recent years, the sustainable transition domain has acknowledged the need to study transitions with a focus on intermediaries and connecting actors [3]. This observation comes from the inherent idealization of policies and protocols that comes from a top-down approach [35,58], and the disconnections that these tools could have in the actual implementation. The role of the connecting actors becomes relevant since their actionable characterization might define whether a policy is successfully adopted and implemented or not. Adding a human-centered perspective, highlights to consider how individuals fit and what their needs are during the implementation of policies [3,57]. Hence, this might affect the governance of transitions in both negative and positive ways.

3.4. Civil Society, Culture, and Social Movements

Laszlo and Laszlo [59] stated that similarly to DNA guides and replicating biological structures, cultural guides, and replicating societal structures provide actionable guidelines for individual action. According to Geertz [60], these guidelines can be referred to as 'models of action' (beliefs, cognitive categories) and 'models for action' (norms, values) [60]. While these topics are already addressed, it remains unclear how these learnings can be applied in practical terms on the sustainable transition arenas and how these cultural guidelines affect and collide with other domains such as politics. Sustainable transition scholars suggest that it is needed to break down civil society categories into types, such as occupational, religious, or political categories, to understand cultural implications [3]. However, to explore this categorization, it is necessary first to consider the implications from an individual perspective to extrapolate that understanding into groups [38,61].

3.5. Transitions in Practice and Everyday Life

According to sustainable transition scholars, there has been a growing interest in focusing research on 'users' and important advances in trying to avoid the dualisms that the 'pro-environmental behavior change' brings to the discussion [3,62]. They argue that the attention that practices such as stability and change in culture conventions, habits, practitioner know-how technologies allow showing persistent resource-intensive patterns, which are more insightful to facilitate the transition [57]. Following these lines, they also mention that this understanding can be extended by considering variations in actors' roles affected by different factors: contextual factors such as technologies, countries, and cultures [51,63]; social factors such as ethnicity, class, and gender [21,64,65]; and self-organization capacity. In other words, these factors directly affect actors' perception of each-other and towards society, also impacting

the agency to act in their everyday life experiences, and whether a person changes their mindset or not [3]. Since these aspects have an effect on the individual level, the human-centered perspective has an important role in the understanding of everyday life's transition practice [36].

3.6. Geography of Transitions

Similar to the everyday-life theme, the geographical aspect of transition is also affected by contextual factors primarily concerning location. The literature highlights the role of niches in terms of geography and how the different aspects that might surround them could influence their capacity to scale up [3]. In terms of further research, some scholars have pointed out the relevance of studying "the maintenance of flows, metabolisms, networks, and circulations to the (re)production of urban life" [66]. In that respect, the human-scale becomes relevant in terms of the relational aspect within individuals and how their characteristics might benefit or effect that maintenance [38,39].

3.7. Ethical Aspects

Due to the inherent characteristics of sustainable transitions, one aspect that requires special attention refers to the exploration of antecedents and mitigation of contemporary issues such as poverty or race, gender, age, or ethnic disparities [67], as well as what could be the impact of future transitions to certain segment of populations. Ethics brings a special challenge in terms of methodologies, since social justice considerations need to be addressed during planning, implementation, and long-term outcome evaluation [68]. Special considerations should be given to marginalized populations such as non-users, non-dominant, and non-stated-based actors [69]. Considering all these ethical concerns, it is highly valuable to consider the Human-Dimension, to understand how these particular groups experience the transitions, and what can be learned and changed in ethical terms and of social justice [58].

3.8. About Businesses and Industries

The role of businesses is a topic that has started to be explored recently. According to already existing studies, there are some key insights to be considered in this domain: (1) technology development needs to be complemented by market formation, value-chain creation, and regulatory and institutional changes, (2) firms often form alliances to achieve such complex tasks and (3) resistance from existing structures and interests is often substantial, (4) firms target institutional change by shaping their institutional environment (political coalition, lobbying, influencing collective expectations) [3]. One important topic to be addressed and that is not yet broadly explored has to do with organizational innovation, and its implications for businesses and transitions [39,70–72]. If we look at the insights gained, these are somehow related to how internal changes within businesses affect the listed insights or the other way around, how implemented actions towards transitions also impact organizational structures. From the Human-Dimension perspective, even though this theme refers to a collectivity of actors, the implication that organization changes could have over the individual aspect could also bring some insights on how to allow transitions; especially if we connect these changes with the agency that the actors perceived they have over transitions [36,73].

3.9. Research Methodologies

The research methodologies theme is mentioned as an evidence of what the opportunities are in terms of methods and transitions as well as its perspectives over what we call the Human-Dimension. For example, there are some scholars that recognize the importance to address system innovation in-the-making by looking at the actors in their negotiation of attempts at system innovation [12,33]. There are some other scholars that point out the need for micro-level investigations of actors, technologies, infrastructures, and institutional context [13,31,40]. Also belonging to the micro-level perspective are the network effects and socio-psychological dynamics that inevitably should include the Human-Dimension. Lastly, the connection between the micro- and macro- levels of analysis [3]. We consider that exploring the Human-Dimension in the aforementioned focuses or methodologies,

could bring new opportunities to have a broader understanding that allows us to locate actionable steps towards sustainable transition(s) [37,38,74].

4. Defining the Human-Dimension Framework

From a critical observation of sustainability transition research gaps, some relationships that share the common characteristic of impacting the actors' human-scale or individuality in a sustainable transition, some patterns can be observed. It was found that there seems to be a group of factors impacting the behavior of the individuals in a transition, and that is a consequence of the characteristics of the context surrounding the actors; we will call these characteristics 'Extrinsic factors'. The other type of characteristic observed was a group of elements, which might vary in each individual depending on the extrinsic factors present. We refer to these types of characteristics as 'Intrinsic factors.' Both extrinsic and intrinsic characteristics served as our basis to construct a conceptual model that could express the Human-Dimension within transitions. Table 2 summarizes the extrinsic and intrinsic factors. Figure 1 shows the corresponding Human-Dimension conceptual framework.

Table 2. Extrinsic and Intrinsic factors influencing individuals in transitions.

Theme	Extrinsic Factors	Intrinsic Factors
Transition pathways	Relations and alignment between individuals either in, or across, regime and/or niches.	Shared characteristics/needs between individuals either in, or across, regime and/or niches.
Power, agency, and politics	Power-relations: "who gets what, when and how."	Individual' perception of one-self and others, which affect the capacity of individuals to make their own free choices: deal with conflict and the capacity of contestations.
Governing transitions	Implementation of policies: adopted or not.	Needs of connecting actors to implement the policies.
Civil society, culture and social movements	Operational guidelines for individual actions. Civil-society categories.	Models of action: beliefs, cognitive categories. Models of actions: norms, values.
Transitions in practice and everyday life	Contextual factors: technologies, countries and cultures. Social factors: ethnicity, class and gender. Self-organization Capacity.	Perception between actors. Agency to act in everyday life. Changes of mindset.
Geography of transitions	Location affects flows, metabolisms, network & circulation to the (re) production of urban life.	Maintenance of flows affected by individual relations.
Ethical aspects	Social Justice: poverty or race, gender, age or ethnic disparities.	Belonging to marginalized groups: non-users, non-dominant, and non-stated-based actors.
Businesses and industries	Organizational innovation.	Perceived agency to act within the organization.
Methodologies	System innovation in-the-making. Micro-level investigations and network effects. Connection between the micro- and macro-levels of analysis.	Actors' negotiations. Socio-psychological dynamics.

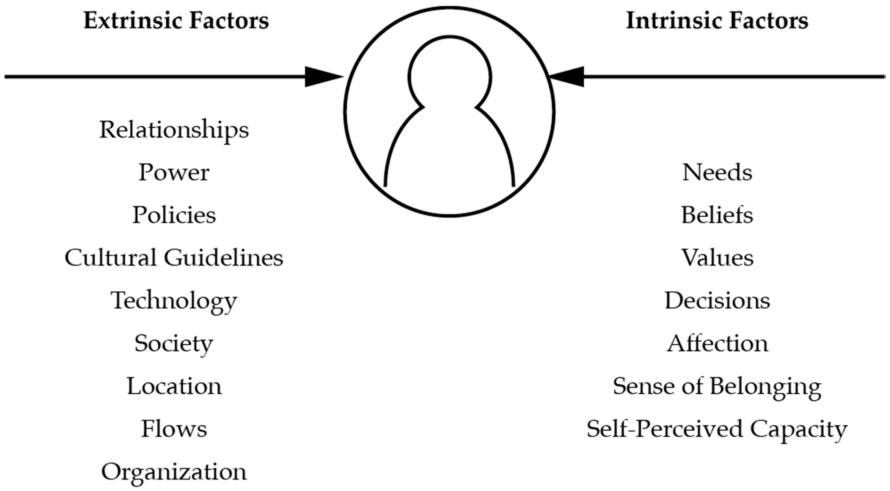


Figure 1. The Human-Dimension conceptual framework. According to our analysis, there are two kinds of factors impacting individuals' actions within a transition: On the left Extrinsic factors, which refer to the external and contextual characteristics influencing actors' actions; on the right, the Intrinsic factors referring to the characteristics that essentially belong to the actors' behaviors.

Based on the distinction found in the characteristics of the gaps affecting individuals in a transition, shown in Table 2, the Human-Dimension framework was constructed, highlighting the minimal characteristics these factors represent. We defined nine Extrinsic factors affecting individuals in a transition. Firstly, the Relationships arising between the actors in the regime and the niche, or within the regime and niche. The next extrinsic factor is Power referring to the perceptions that individuals have over others' agency to act and the conditions that allow differences in power. Policies are referring to the established structures that enable actors' agencies. Cultural Guidelines are referring to the social characteristics that guide individuals' behaviors. Technology refers to the technological access of an actor. Society refers to the beliefs concerning ethnicity, class, and gender, which affect the moral and ethical constructs and permeate individuals' behaviors. Location refers to the geography and territory in which an actor unfolds. Flows are referring to the directions and circulation of the relationships emerging in a transition. Finally, Organization refers to the dynamics of a network of actors in a transition.

Concerning the intrinsic factors, these are determined and molded by the extrinsic factors; however, what and how an actor decides to act is ultimately an autonomous decision. The located intrinsic factors are the Needs, which could refer to an individual's physical, physiological, emotional, and spiritual requirements to perform any activity within a transition. The Beliefs are related to the moral, ethical, and social constructs that affect individuals' actions. Values refer to what an individual considers to be essential and beneficial. The Decisions guided by the other intrinsic factors are considered here because the extrinsic factors might ultimately affect how these decisions are expressed. Affection refers to whom an individual actor cares for in an existing transition network. The Sense of Belonging refers to the perception of being part of a group due to similar values, norms, and beliefs. The Self-Perceived capacity refers to the perception that the actors have to act upon transitions.

4.1. Human-Centered Lenses

How to bring human-centeredness to the transition and innovation design processes has been widely explored. Design has been recognized as a domain that brings the possibility to understand what the role of individuals could be in achieving sustainable transitions [37,38,74–77]. Within design, human-centeredness arises as one of the fundamental characteristics that contribute to understanding human activity and human concerns during innovation processes [78]. It has been recognized as an essential factor that could contribute to social and sustainable projects [74,79,80].

Design scholars define human-centered design (HCD) as a group of "methods and principles aimed to support the design of useful, usable, pleasurable and meaningful products or services for people" [81]. The main principle of these methods is describing how to gain and apply knowledge for the user, and design for and with the gained knowledge. HCD has become a valuable asset that has been widely explored in the transition processes since it helps to meet human needs and aspirations in order to deliver a wide variety of outputs or solutions proposals, ranging from products and services, processes, organizational methods, positions, strategies, and governance [82]. HCD responds to what the design outcome means to us; in the design discourse, meanings are central, and in order to sustain those meanings, it is also an intrinsically motivating activity that could only succeed when it inspires and sustains sufficiently large networks of stakeholders [83]. HCD acknowledges that the search of the present for paths to desirable future design must be embedded in communities that claim a stake in the future [83]. In that sense, using the HCD lenses becomes a tool and mindset that could help create shared meanings to systematically narrate imaginable forms of living and make them realizable [84].

By making the different meanings that converge in a network of actors within a sustainable transition explicit, it seems possible to understand the dynamics to identify the missing linkages needed to make sustainable transitions successful and implementable. One of the particularities of sustainable transitions is that the emerging networks within the transitions share the commonality to pursue sustainability; the key lies in understanding what it means for each of the individuals involved to make it advance. An example of how overlooking the discursive conflicts in transitions could become barriers is the case of the wind turbines, where 'mundane' concerns such as noise and visual obstruction were reported to be more important barriers for renewable energy development, than environmental controversies [49]. The process then can be looked at from a social resilience perspective, where the "capacity to foster, engage in, and sustain positive relationships" is needed for the "transformation of adversity into personal, relational, and collective growth" [85]; then, finding ways to enable and foster those relationships becomes relevant to advance transitions.

4.2. Making Transitions Actionable through the Human-Dimension Conceptual Framework

To allow the emergence of meanings within a transition, taking a human-centeredness stand can help to elicit intrinsic factors such as values and latent needs of individuals [86,87], and then help in the process of meaning-making. These factors inform about the different perspectives that individuals bring to a process of a sustainable transition. By acknowledging the intrinsic factors, it might be also possible to understand how the extrinsic factors are affecting the dynamics within a transition. Since human-centeredness focuses on the individual conditions of humans, and the already existing dimensions of niche, regime, and landscape provide information with regard to the extrinsic factors, the intrinsic factors will be the focus to analyze transitions.

To translate the intrinsic factors into observable factors, we transferred the different factors into individual expressions that might facilitate the understanding and location of the factors. The different factors were landed into a discursive model where the need would be expressed from the perspective of "I," so the factor would be translated to "I need." The final Human-Dimension conceptual framework can be found in Table 3.

Table 3. Making the Intrinsic Factor Actionable.

Intrinsic Factor	Discursive Model
Needs	I need …
Beliefs	I think …
Values	I want …
Decisions	I do …
Affection	I care for …
Sense of belonging	I am …
Self-perceived capacity	I can …

5. Macro-Level Analysis of Delft Sustainable Development City-Making

To clarify how considering the Human-Dimension can add an exciting layer to the research on socio-technical sustainable transitions, the Delft city sustainable development plan of Schieoevers Noord was an illustrative scenario analyzing the different dimensions of transition. As a first step in the analysis, we will use the MLP framework (Figure 2) to make a macro-level analysis of the context.

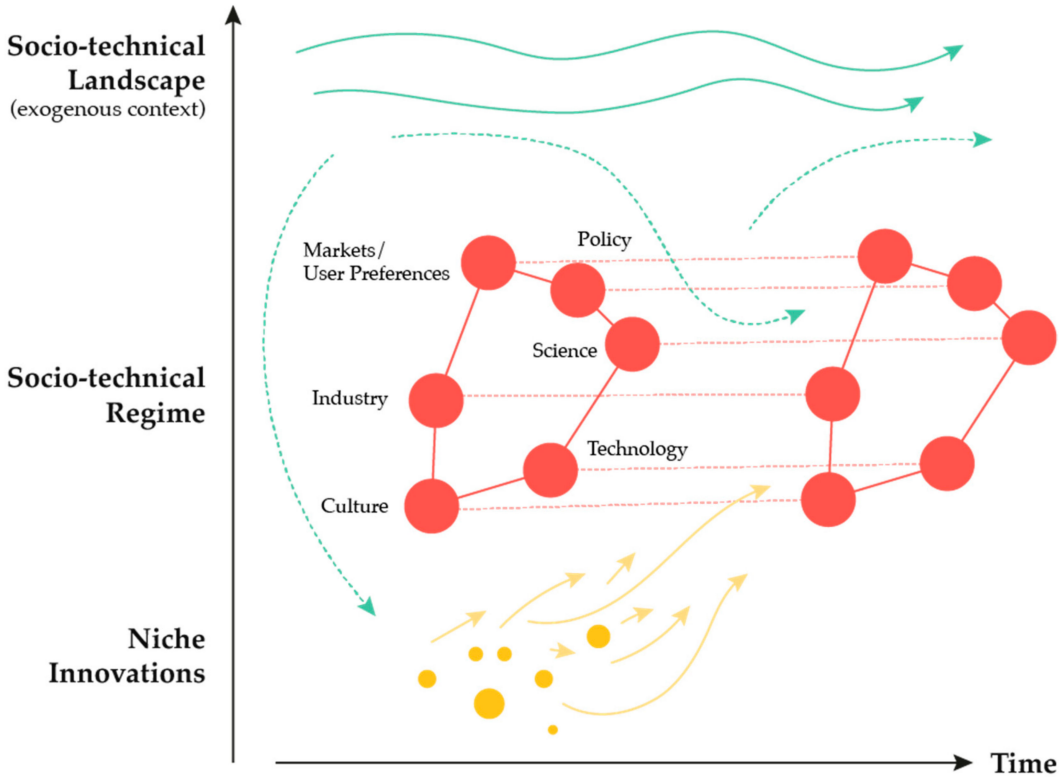


Figure 2. The Multi-Level Perspective analysis framework by Geels [18].

The Delft city sustainable development arises in a context to address the global challenges posed by the United Nations; The Netherlands has signed for the National Climate Agreement (NCA) and the Paris Agreement [88,89]. These agreements' main essence is to reduce greenhouse gas emissions in The Netherlands [90]. While policies are developed and (getting) in place for sustainable transitions [20], it remains unclear whether the right actions are currently undertaken.

Initiatives and startups for sustainable transitions are popping up throughout The Netherlands, and local governments have been pushed to take an active role in implementing policies that align with the national agreements. That is the case of the city-developments taking place in the province of Zuid-Holland, especially the MRDH Region. Within the MRDH, one of the projects trying to highlight pioneering in transition is the case of the plan of Schieoevers Noord for which the following MLP analysis was performed.

5.1. Landscape Development

Within The Netherlands, there is an increasing interest in sustainable housing. Almost half of The Netherlands' population has the desire to have an energy-efficient house [91]. According to a CBS report on sustainability living, nine out of ten people are aware of the growing problems of greenhouse gasses, ground health, and the increase of energy usage. On top of that, nine out of ten are consciously aware of their energy consumption [92]. In that sense, we see a cultural change towards more awareness and consciously living on sustainable matters. In recent research by the ESB, it is found that in the Dutch housing industry, having invested in sustainable alternatives such as solar

panels are paid out on the sale of that house. This means that the amount that is invested in the house goes on top of the value of that house [93]. Alongside these trends for interest in sustainable housing, there are also economic effects that trigger the need for another lifestyle. Another factor is the increasing prices of both fuel and heating oil, compared to 2000 [94,95].

Considering the cultural landscape, the technological revolution has influenced the Dutch by almost doubling their smartphones and text messaging usage compared to 2012 [96]. This has led to the opportunity to obtain knowledge in various domains and practices. Interestingly, 67% of the population has searched for health and lifestyle-related subjects in 2018 [96]. People have not only searched for healthier lifestyles, but also started practicing it. There has been a growth of 10% from 2015 to 2017 in people that go to the gym. This means that about 2.3 million people go to the gym in The Netherlands. On a macroeconomic level, there has been a growth of 2.7% in 2018, with respect to 2.9% in 2017; people were not tempted to move houses because of the economic crisis. However, since 2013, more jobs were available in comparison to unemployed people 80/100. During this period, more people also started to move houses (30 to 65) years.

Together with the national agreements regarding sustainability, these factors are challenging governments to reimagine their city-plans by directing them towards sustainable directions that correspond to both policy agreements and, as above indicated, citizen demands. Another aspect to consider is demographic indicators that point out cities as the social organization that will continue prevailing and growing [97]. Next to that, migratory trends and globalization are demanding for cities to be prepared to embrace diversity [52], which because of the global sustainability paradigms, will also need to be prepared for an unprecedented future that considers profound changes in people's lifestyles [52].

5.2. Regime Developments

Different cities across The Netherlands are being pushed by the national and global landscape demands to prepare for the upcoming conditions on a local level. The Rijksoverheid put forward the 'Klimaat Wet', which states that municipalities have to be in 2050 energy-neutral in emission [89]. Considering these goals in the climate adaptation strategic report of Zuid-Holland, it promotes and facilitates sustainable innovation, pilots, and projects [98]. One important characteristic about the region is the many top knowledge institutions such as Deltares, Delft University of Technology, and Global Centre on Adaptation that are located and could play an essential role in the planning since one of the critical elements of the strategy is the requirement for sustainable living environments. These ambitions had become a challenge for the different municipalities in conveying policies, norms, and regulations that facilitate the process [98].

The municipality of Delft has responded to the region's ambitions by setting the objective to reduce their emission of CO2 in 2020 by 35% in comparison to 1990 and become energy neutral in 2050 [98], which has been contracted in their 'E-deal' with 16 local partners [99]. Taking these ambitions as a starting point in January 2018, the Delft municipality deployed its strategic spatial-economic vision for the city [100], which involves a set of different actors according to the specific conditions and context of the city.

One of Delft's significant challenges is trying to address its strategic vision is the housing needs in the region. For this matter, the Delft municipality stipulated that in the period up to 2040, 15,000 new homes will be developed, and 10,000 jobs at all levels should have room in the city [44]. These requirements had been settled up under the vision of turning Delft into the 'Capital of Technology & Innovation', a reason why one of the fundamental decisions in this planning has been the territory's definition. The area of Schieoevers Noord has been chosen due to its geographical, social, economic, technological, and mobility characteristics [44].

From a market perspective, the Schieoevers Noord location has some essential characteristics that allow opportunities for densification. The first one has to connect two important social areas: the Delft University of Technology campus and the central area. This turns development as an attractive

point in which to develop living and working environments. Another important aspect within the Market perspective is the geographical location of the city, which is in between two of the most important city centers in The Netherlands: the Hague City and Rotterdam. The specific challenges that these two cities face regarding housing demands bring exciting opportunities for the development in Schieoevers Noord.

From a technology and industry perspective, the sustainability ambitions of becoming energy neutral bring some essential challenges, the reason why access to technological advancements is vital. In that sense, the combination of knowledge that the Delft University of Technology and the industrial businesses in the area of Schieoevers Noord offer makes it a space with many opportunities. This area has been historically known as an important industrial area of the region [100], which according to municipality planning fits with the 'Capital of Technology and Innovation' vision for the city. The presence of these two ecosystems is also crucial in terms of a scientific and cultural perspective since it might put in place the needed supplies and mindset for experimentation.

Finally, on the policy side, Delft's municipality has developed some important proposals that might increase the opportunities for transition. One of these developments has to do with the agreement to maintain the balance between initiatives and protect local residents, participation, IT implications, internal organization, and the borders. For that matter, in June 2017, the municipality adopted the 'Delfts Doen' participation framework, which, framed under the Environmental Act (Omgevingswet), established a set of rules for participation in Delfts developments [101].

5.3. Niche Developments

In terms of 'Niche Developments', one important aspect to acknowledge is that governmental efforts have been put into a non-regime effort in this specific case. That turns most of the actors involved to incumbent actors who are opening windows of opportunity for the existing niche developments. Those niche developments could be actually embedded into the actual regime structure, which is the case of the Campus train station in the south of Delft, from which several regime actors had put into place the needed requirements to push the initiative. In this case, the federal policy agreements allowed the area to obtain the economic resources for the development of the south station of the city Delft Campus station, which is meant to be The Netherlands' first energy-neutral station [102]. This part of the plan has been designated as a priority in the government plan of development 2018–2022. This part of the plan has been set up in partnership with the Province of Zuid-Holland, Watertorenberaad (Ministry of Interior and Kingdom Relations), the Municipality of Delft, and different actors belonging to the rail industry.

The particular characteristics of the regime actors present in this area and the synergies put in place by the national, regional, and local visions allowed niche actors' involvement and emergence, which within those visions, found the right characteristics to make experimentation. An example is Green Village, a Sustainable Innovation Living Lab embedded in the Delft University of Technology infrastructure. The European Regional Development Foundation fosters the project; it is involved in developing the needed knowledge to accelerate the transition in this area and support the Schieoevers Noord development plan specifically.

Lastly, citizen organizations have also found windows of opportunity within the development plans and the policies put in place. This is the Tiny Houses project, which belongs to an international movement that highlights minimalistic and sustainable living and is self-constructed on a surface area of 40m^2. This project found its echo on the building decree of self-sufficiency, which has been propelled with an experimental character for design, construction, technical application, energy, sustainability, and social concept [103]. This is just an example of the citizen initiatives that might have an opportunity to sustain the sustainable transition in Delft.

6. Adding the Human-Dimension

The last step in our analysis was to apply the Human-Dimension framework to the introduced illustrative scenario of Delft city sustainable development. One of the exciting characteristics of the chosen sustainable transition context is that the lines between the regime and the niche become diffuse in an ecosystem trying to adapt by being pushed by a regime initiative. This is exactly where the Human-Dimension becomes relevant since it might become helpful to clarify the barriers or opportunities to accelerate the transition. Within this zooming-in exercise, we choose actors who were somehow involved in the development of the Schieoevers Noord, without previous distinction as regime or niche, because we believe that these actors, even if they belong to an organization that could be considered as part of the regime, their perspective could unveil a mindset that could be considered as part of the niches' development.

Five different types of actors have participated in the interviews. The first one belongs to the industry group consisting of area developers actors, who are in charge of defining the transition's structural and technical routes. The second group is government actors belonging to the Municipality of Delft, who have a decision-making role within the transition according to their position. The third is academy, who are actors belonging to the research projects involved in the development of knowledge to serve this transition. Businesses (SME) actors who, because of the current developing area's nature, could be affected by the development plans; they are the fourth group. The last group is actors belonging to the citizens organization, whose activities make them somehow involved with the development plans as active participants. Table 4 shows the answers of the participants concerning each of the Human-Dimension concepts.

Table 4. Human-Dimension conceptual framework illustrated with interviewees' quotes.

Human-Dimension	Interviewed Group	Quote
Needs *(I need)*	Government	" . . . when you have a plan, and you have a general idea of what you want, one group thinks it's a good idea, but another group thinks it's a bad idea. Then you can invite both groups to have a discussion with each other . . . that also helps us have insights about the opinions, and that can be very useful." " . . . sometimes priorities are not matching, and when people do not get what they really want, then they are really disappointed. It doesn't matter what the argument was; the plan is not good; it is not okay." "You don't have all the knowledge here inside (the municipality). We have a lot of experience, a lot of knowledge, but there's much more knowledge outside."
	Industry (Developers)	"The development is in everyone's interest. What good is it for the municipality owning a property that has been there (in the developing area) for three years? Nobody cares. Neither do residents. Nobody. Well, well, those are our problems."
	Business (SME)	" . . . all the decisions and all the plans that are made by politicians. They are bigger scale, and so it makes it very abstract, and I don't believe that all this can be made in a very detailed plan on a big scale." "if you don't take this responsibility, people (won't) hear you, the municipality does not hear you. They will not take into account your wishes."
	Academy	" . . . so that's where the challenge lies and whether it's going to be a success, is to a large extent dependent on these short-term parties, well, willing to see the value and, these long-term solutions."
	Citizens	"The municipality really loved all our ideas like what we want to do here (the land) and with the neighborhood . . . But yeah, because the process took so much time, they are actually kind of killing our enthusiasm."

Table 4. *Cont.*

Human-Dimension	Interviewed Group	Quote
Beliefs *(I think)*	Government	"Sustainability plus is a unique selling point. And this unique selling point, hum, I think, stands for a certain value of the building you make. I think that you can make it economically interesting to invest in sustainability," "What we've tried to tell them (Industry and Businesses) is to see it in a helicopter view. Your asset is the whole area, and to make this asset, the most worthful, and make the most profit; It's good to invest in this area and not only your own plot."
	Industry (Developers)	" . . . accumulating ambitions in almost every area of development. So, in Delft Zuid as well, Delft campus. But I think one of the distinctive parameters of Delft Zuid is its potential to be a mobility hub."
	Business (SME)	" . . . this (developing area) is a place with a lot of different people and different activities. And I like them to be interrelated with each other . . . This is more important for me than an old historical place. I like that, but it's most important to have a dynamic place . . . "
	Academy	" . . . what all these municipalities want, they want good houses, they would like to have nice jobs, etcetera. But yeah, heavy industry, which is needed actually, yeah, they don't want it. So they don't have enough, uh, areas located in their physical plans for that type of industry. So if you want to get rid of these industries, it is quite difficult." "There's so much potential in that area, I think it would be very nice if it becomes a hub for mobility to the university and to Delft . . . If you expect the university to grow, then you need this."
	Citizens	"I think that the system doesn't allow for the idealistic goals." " . . . I think the people, the public servant we worked with, is also very frustrated from the process so you can see the frustration, he/she is being professional in hiding it."
Values *(I want)*	Government	" . . . the readiness to change, the awareness of having to change policy. If I don't want to change my policy, I don't have to participate in a participation process. The only thing I can do is explain it once again. But if I cannot change my plan or my vision, why should I start a participation project, If nothing will change? So there must be an awareness of time and willingness to change things and also can change things." "If they can make a building for half the price . . . if it is not sustainable, and sustainability is not an issue, then they will make a building half of price as a "sustainable building." It's all about money with these guys. If they can make 50 cents on the Euro, they will earn 50 cents on the Euro." " . . . sometimes you want things for the future, that people right now are really opposed to purchasing . . . it's difficult for people to see the steps really far away. So sometimes you have to do something that's not popular, because, then we're there. And that's really okay. And people are really happy when this is what we're doing. So that's very difficult."
	Industry (Developers)	" . . . To build a large building. To create a mix function area. That's our goal. And that is our business." " . . . it's also an experiment, so you have no idea if it will work. But I think it's really nice to try it, to let it (make it) work." "There is an increased shortage of student housing, it is increasing in the next year to up to 3000 for units for students. We want them to be affordable for students, international as well as national. That is our main interest."
	Business (SME)	"I hope that there will still be some space for companies here, but I'm not sure if this is realistic." "Our 'blue line project' I connect with the development, and the ambition for Delft to become the knowledge capital of The Netherlands." " . . . so if we have to move, we may go to the area of Eindhoven. So that's my main concern." " . . . it's not to (be a game of) winning or losing, but much more of understanding each other."
	Academy	"The challenge is: are parties willing to wait and put aside their individual interests for the greater good?"
	Citizens	"You have the initiative, and you help them also because you have a shared vision."

Table 4. *Cont.*

Human-Dimension	Interviewed Group	Quote
Decisions *(I do)*	Government	" . . . I'm not deciding. I give advice" " . . . the main goal is to make better plans together, and not to get as many people being happy with a plan, that's a possible consequence." " . . . in the municipality you are living in your own bubble and you already make a lot of steps, and when the other side—so the citizens—when they don't, let's say it like this: last year when we were doing the project, we already made a lot of steps and were fully into the project. And when I have a year of history and then I'm eager to involve you, then it's new for you. So I am way further than you. So that is not matching. So that's also a lesson for us. Decide when you share things, or ask. Sometimes sharing is enough. Then people know about it."
	Industry (Developers)	" . . . via two or maybe three interviews, we call it a dialogue because the interview for me is one way, more one way. It's more of a dialogue." " . . . students are good pioneers; it does not need to be done or completed. Students are a flexible type of tenants. They will put off things like noise, or other kinds of stuff that in other situations wouldn't be acceptable . . . "
Affection *(I care for)*	Government	"So we had about eight meetings, and they were shocked about it because they said well, "why are there so many? Why are there so many people wanting to think about it? That's not good—that's a bad sign because they are against our plans." And I said no, this is good. That is great because this shows a lot of engagement. That isn't a part of the city where people are being born and die at the same place. So, they are really happy to live there . . . So, you should be happy about it and embrace it . . . if you don't have that engagement anymore, they don't have trust in the government." "Because now we have about 15 people thinking about what is the best way to make it there. But I think a lot of people here can tell us a lot. For instance, "when I'm walking there at 11 o'clock in the evening, I'm not feeling safe." So, they have a lot of experience we can use. And now we are not even asking." " . . . we have our own policy on, for example, housing. We know exactly what we need for the next 10 years. So that is the perspective on what we think is needed. But for example, in Tanthof a lot of people lived there their whole life, and they are really happy. They want to stay there, but now the elderly are living in the family apartments. That is not the best match. So maybe for Tanthof, it would be interesting to build more for elderly people. But then they stay in their own area. That is one of the things we already know from Tanthof."
	Industry (Developers)	" . . . there are all kinds of environmental contours in which companies have their rights. And there you will build in the middle of it. That is how those problems arise, and that is why the project leaders we sit down with are civil servants, who are often hired. They would all want to, but they just can't." "the current companies that are situated in Schieoevers North, they want to have a place for new developments, and now we're kind of pushing them away. So you want to incorporate them."
	Business (SME)	" . . . it is very dark over there (development area) . . . there's not too much social control on it . . . you find all kinds of stuff like needles from a drug addiction that's there . . . And there is much more traffic by students, also female students. I'm also a father, and I would not like to have my daughter on the bike, (here) without more light, without proper social control."
	Citizens	" . . . Participation . . . it scares them because it's, it's everything different. Like there is no set way that a certain process is going, so every time there's an initiative there that it's a new way and I think that's what scares them."

Table 4. *Cont.*

Human-Dimension	Interviewed Group	Quote
Sense of Belonging *(I am)*	Government	" . . . a lot of people do that as they have a lot of passion and they really want it like a 10, an A+, it has to be good. And from the professional way, from the municipality, not everything has to be a 10."
	Citizens	" . . . it's also that I like this. I like old places with history in it, and when it's all new and smooth and expensive, maybe I don't feel so good there." "It's not really okay because yeah, when one person says I don't like the smell (of an industrial business), for example, then the company has to leave. Yeah. So it's not so simple to combine this."
Self-perceived Capacity *(I can)*	Government	"You've seen these eight ambitions (sustainable ambitions set for the plan) I presented three or four months ago in Rotterdam, made by Marco Brockman. And well, actually, these are the only more or less boundaries we have." " . . . I can say it won't be 60 m high, it will only be 50 m high, then that's a fact for them (Industry area developers) as well. And, then it's their choice to make a plan for 50 m or not. What they can also do, of course, is then say, well,—we'll do nothing, then we leave it as it is.—Good luck, municipality. We have a building half demolished now; we leave it as it is.—Unless you say well-developing company, go ahead with your 60-m high-rise building—So, yeah, it's not the situation, and let's be clear on that. But if they want to, they could play it like that hard." " . . . people want to have these conditions because then they know this is already decided, and this is the part which I can decide on. Otherwise, in the end, you have a problem because you don't, you can't measure your inputs on those conditions. And then it gets fluent, and then it goes wrong."
	Industry (Developers)	" . . . the municipality also gives us boundaries for what we can do, what you cannot do, and we need to. We need to listen to these boundaries, so we can't really do something different." "So it's important for the municipality and the company to be the selected company to organize . . . there are organizations that are willing and support the area development, instead of saying,—okay, I am gonna pull the brakes, very firmly because I'm not happy with what is going—." "You have to understand that the Delft municipality is a pretty poor municipality. They had large ambitions in the past in the Spoorzone, and they haven't recovered yet from that. So there is a need to earn money."
	Business (SME)	" . . . circular economy is also difficult because we work with new materials and cannot use old materials. Yeah, when there are possibilities to use materials that are made out of old materials, Yeah, that would be nice, but I don't see it." "Okay, they have this 'people-planet-profit' idea . . . I've always found it funny that people and the planet are not so difficult to implement but the profit part is, it's a bit more, a bit more tricky."
	Citizens	" . . . in communication having the right skills to really understand what is going on. So, during this process (the development), many communications and not valuing our time in a place like I think, combined with other people, like over $400. So, if I charge my normal income, that's a loss for me. That's actually in hindsight that prices weren't too much so hesitant to do it again." "I think the most time we spend on facilitating internal communication. —Well, so can you help us sell this internally? Can you make a plan? Okay, you make this one, can you make that one? I can't convince my colleagues?—" " . . . a municipality is not a business and is not really debt-free. There are a lot of rules and restrictions. But yeah, a bit of freedom to stretch those limits."

6.1. Needs (I Need)

Looking at the actors' needs allows the observation that needs are different on first appearance. Developers share the need to remain realistic and incorporate their business needs. Public servants, on the other hand, need to satisfy citizens and the national government. These needs indicate the requirements of the domain they are working from, in which the developers can be viewed as incumbent actors. On an individual level, there are needs to have fewer rules and have the right articulation of each other's needs in meetings.

For example, one of the actors explained that the business need was to remain resistant to the municipality's plans. However, when the actor discussed it with a public servant, they understood each other's needs and came with an alternative option. That option offered businesses the possibility to remain in their locations and municipality to work in a coalition with businesses to concretize their plans. By explaining each other's needs, they could come together to an alternative that would both satisfy their needs.

As opposed to the business or domain needs, the individual needs required that each individual was listened to, could speak up freely, and participate in discussion with an equal voice. What happens in such a meeting is that the municipality addresses it differently; from 'you have to do' towards 'we have to do.' During these meetings, collaboration happens, and needs between parties are articulated so that latent and tacit needs rise above the obvious and explicit needs. From that, new alternative options can be explored.

6.2. Beliefs (I Think)

Beliefs indicate similarities and differences. The similarity can be found in the envisioned project. Though the same envisioned project is looked upon from their different perspective, and their domain fits within that envisioned perspective. In the illustrative case, this is resembled by the various visions and beliefs of each individual. Academia shows their interest in the project's potential concerning the university and has specific thoughts according to what they believe to be necessary. On the other hand, are the developers, who think from their perspective for developing the area and value that people will buy the houses. During discussions, these perspectives will guide the individuals' beliefs and what they think of particular directions.

It is essential that beliefs are exposed and that each individual is allowed and dares to do so. Then, all beliefs can be put on the table, serving as a basis to develop new thoughts and perspectives. An example from omission is the 'misbelief' that the public servant considered the project to be better for housing than the existing industries. However, this belief changed when a business owner in the industry turned the project into its advantage.

When these individuals come together, beliefs must be put on the table. Nevertheless, for doing that, trust and openness have to be in place. They are getting to see together the greater good, setting personal or individual beliefs aside. This requires looking beyond one's perspective and seeing the whole of the project. In that sense, the envisioned project can serve as a boundary object to collaboratively address the perspectives, and stresses the importance of co-creating such envisioned projects.

6.3. Values (I Want)

An overarching trend in individual values during sustainable transitions was to build relationships between the parties involved, to overcome 'different aims' from each other parties. The thing that would withhold individuals from doing so comes from the attached stigma of the domain they are working on. Civil servants are generally regarded as non-ambitious and non-open. Developers and business owners only value money. Interestingly, the current study indicates that when specific individuals come together, these stigmas are surpassed, and these individuals propel relationships between parties, enabling the emergence of collective values in the project.

The emerging values collectively serve as a set of values that could not surface without establishing the relationships between values. For that, the values have to be made explicit and also surpass stigma values. This does mean to reason through both normative and pragmatic orientations, as both are (un)consciously used. It is making the normative pragmatic and the pragmatic normative.

6.4. Decisions (I Do)

The decisions that are being made by the actors bring about what they do. However, what they do does resemble what they will decide. In this case, this is made explicit by the civil servants.

One individual is responsible for communicating with the citizens what is going to happen. For such an event, his or her preference is to bring news that satisfies the citizens. On the other hand, another public servant responsible for implementing the municipality vision acts more according to the developer and public wishes. That shows that even within one domain, the municipality could favor the citizens' side and another one in favor of the developers.

The consequences can be seen when this takes place between two sectors, like what happened between the municipality when discussed with an incumbent business owner. A civil servant explained the problem from a citizen's perspective—that the citizen would like to travel across the business owner's land. Though the business owner was first not open to the idea that his or her practice was to conduct business in that location, for that opening, the land for citizens did not belong to the actions performed by the business. By overemphasizing the citizen's perspective, the civil servant could trigger the business owner to empathize with their child. This simple connection between the citizen and the business owner's child gave the business owner the connection to imagine and feel the relevance of what the civil servant wanted to do. From this, the business owner became a pro-active participant in the transition instead of an incumbent actor. The result was even more fruitful visibility and equity than at first sight.

The individual decision of the business owner led to value for the business as a whole. It is important to note that the individual who could relate to their child opened up their mind and changed from an incumbent actor to a pro-active transition actor. To make that happen, the business owner had to empathize with the people involved in that area's future vision. The business owner had to be open and give in to the local perspective and leave his or her usual business decisions out of the room. From that opening up to the future, a vision led to seeing the value that the approach could bring to the business.

Besides the approach of the business owner, the civil servant also fruitfully contacted the business owner. As the civil servant was not pushing a municipal agenda but an citizen agenda, the business owner was able to empathize. Had it been too much on the enforcement or attack side instead of the collaborative side, this conversation would have differed.

6.5. Affections (I Care For)

At first glance, each domain cares for its own and one connecting actor. Probing this, however, elicits more tacit connections. The municipality cares for its citizens and their wishes. For that, the citizens must state their wishes. These wishes implicitly state what the other domains should care for, as what the citizens care for becomes what the municipality cares for, although the other domains care differently. The business owner does not care what the citizens want but cares about what the municipality wants. However, these 'wants' are connected and so form a connecting link between all domains.

The individual plays an essential role in the flow of 'wants' through that connecting link. If the individual is not open to seeing other actors' 'wants', the individual could serve as a barrier to progress and so plays the incumbent actor. Caring for the bigger whole and thus being open to care for all relevant actors is crucial, as this acts as a pathway for eliciting tacit connections, and, as a result, collective values.

6.6. Sense of Belonging (I Am)

The roles that the individuals play differ per domain and project. These roles are closely related to the enactments of the individuals. Such a role expresses how the individual will act, what the individual belongs to, and how one should be. In that way, the civil servant explains, "I am an advisor, and an advisor advises and does not decide."

The domain that the person belongs to puts, as already explained before, stigma on the individual. In the same sense, the civil servant explained: " ... and many people do that as they have much

passion and want it like a 10, an A+, it has to be good. Moreover, from the professional way, from the municipality, not everything has to be a 10 . . . "

To what domain the individual belongs to and how they believe that domain enacts determines how the individual will enact. Interestingly, an individual can detach from that belief and use its capacities to leverage themselves beyond the domain. This enables the individual to go beyond the stigma and brings about the possibility for the individual to create windows of opportunity.

6.7. Self-Perceived Capacity (I Can)

The domains have an individual capacity to act. The municipality can act as an official and legislative body. However, one civil servant explained that the self-perceived capacity to act is not as high as one might think. Performing a particular activity can be possible from a legal perspective but impossible from a social perspective. Those perceptions of what one can do determine how one will enact. The perception sets the enactment.

This perceived capacity also depends on how that capacity relates to the domain. As a civil servant, individuals perceive a high legal capacity, but low social capacity. However, developers and citizens perceive that civil servants set out what is possible and explain that this is very restrictive. For that, the developers and citizens do not feel that they have enough capacity to enact how the project will look like in the future. This results in their capacity to enact remaining within their domain, but not across domains.

7. Discussion and Conclusions

All in all, it seems that every actor is affected by linkages between the Human-Dimension within the process and the interactions of the actor's network interactions, which conform to the transition. From previous analysis, we can conclude that the Needs factor affects the mutual understanding within the transition; it then becomes crucial that the actors belonging to this transition have a voice to express those needs. We can also conclude that the decisions made by each actor might reflect the 'truth' directions that are driving that specific actor. The decisions made by an individual can actually be opposed to the expressed needs. Consequently, the discussions on an individual level become relevant to preventing conflicts since the common understanding created by expressing their needs could facilitate setting directions and therefore making more collective decisions. The analysis also unveils that this can be more related to an emotional level than an actual reasoning of their needs.

The emotionality within decisions brings into play the relevance of being aware of the beliefs of each actor, since this might help to clarify what the actual values from that particular actor are, even though they express needs that differ from these values. The beliefs could also bring more clarity about what is the perspective of each actor towards the transition. Within that perspective, the Belonging and Self-perceived Capacity could help form that perspective, or the other way around; the sense of belonging from an actor to a particular domain could determinate how capable s/he feels to act, accordingly to which his/her beliefs should be decided.

Finally, one of the most interesting factors is the one that is related to the affection or who the actors care about; for example, the 'decision' dimension shows the relevance of knowing whom the actors care for since this could drive to a common understanding about what is believed should happen within the transition. The Human-Dimension components could then transform their 'models of action' to 'models for action' [60]; we can refer to the outcome from a Human-Dimension analysis as the attitude towards transition. We define attitude as the way of thinking and the feeling that an actor has towards a transition, ultimately defining their actions. This attitude is shaped by interactions with the other involved actors, the information that they have about the transition, its interest, and the context in which the transition occurs.

This attitude will affect the windows of opportunity that arise in the transition—knowing how this attitude is conformed and how it can be influenced is an essential process in understanding and defining the agenda of a specific transition context. Another important aspect to take into consideration

is the alignment of the attitude of the actors. A good example of how critical this process could be is the actor' interests in staying in the area in which the developments took place. The attitude towards the transition changed when the needs and values were listened to. Then, the actor could see the added value from the transition for his/her own sake. This led the actor to have an active and positive attitude and shape its space of opportunity accordingly.

The presented study elaborated upon the Human-Dimension within sustainability transition research, by making intrinsic factors actionable. The current research could serve as an initiator for making sustainable transitions operational as well. The Human-Dimension can be seen as the missing dimension to push the envelope of current transition studies. The HCD perspective promises to be a natural fit for the same. Figure 3 shows how Human-Dimension can be positioned in the MLP framework.

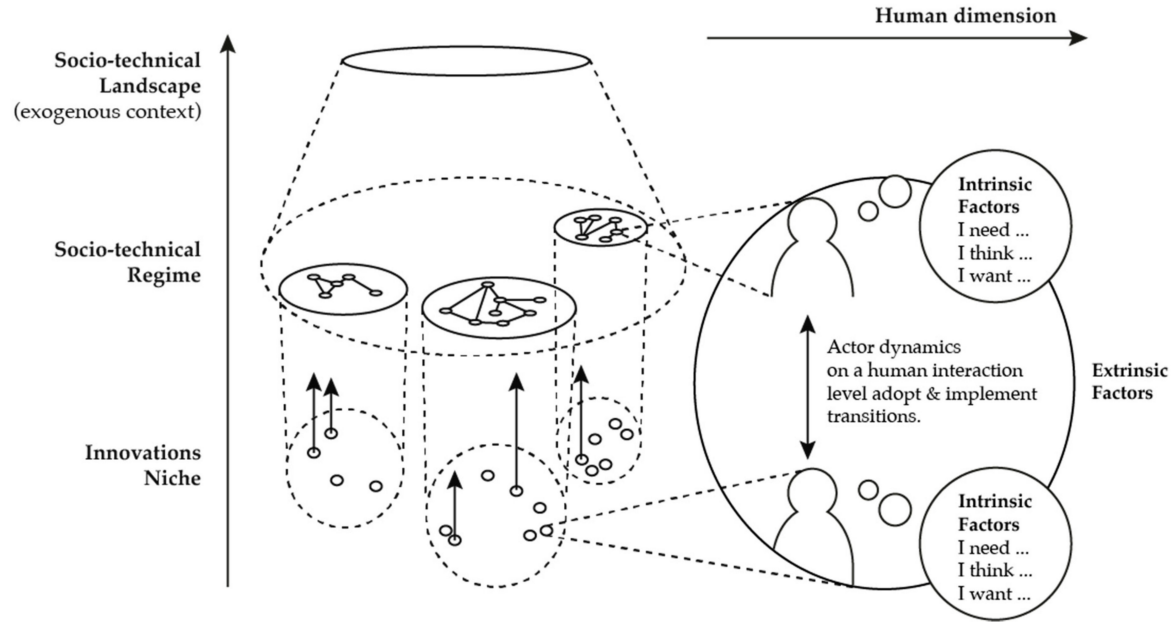


Figure 3. The Human-Dimension positioned in the Multi-Level Perspective Framework.

To conclude, the current work shows the importance of considering Human-Dimension in transition studies; it put forward attempts to provide a starting point serving as the operationalizing vehicle of sustainability transition research. More precisely, when enacting transitions, within dynamics, the windows for opportunity emerge and so 'make or break' the enactment of individuals and the transitions. Further research on the opportunities highlighted by the Human-Dimension framework is welcomed, and could be elaborated upon to translate the windows of opportunity to actionable steps.

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