

# Design-Driven Conflicts: Exploring the Contribution of Design for Constructing Social Controversies from a Theoretical Standpoint

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**Abstract:** Controversies are an inseparable part of social systems which, if constructed properly, can create a unique condition for higher-order learning. In addition, design inquiry, as a process of thought and planning, is also a constructive process. This provokes the question of how to construct controversies from a designerly perspective in order to steer higher-order learning. This paper presents a theoretical contribution to the field of social system design by providing the first insights into design intervention to facilitate a network of allied construction. Through a systematic review of the concept of conflict and disagreement, the link between controversies and knowledge transmission is examined in order to highlight the benefit of controversies in a constructive way. Next to that, the essential steps for constructing a network of allies are proposed. These steps are compared with specific aspects of design in order to unfold the advantages of design for network construction. Finally, the paper wraps up with concluding remarks about the necessity of having a bridging step from theory to action in order to facilitate the construction of controversies in a real-life context.

**Keywords:** design-driven conflicts; conflict construction; network construction; higher-order learning



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## 1. Introduction

One thing is certain about the future: human social systems will be more complex, dynamic, and uncertain than they are today [1,2]. In particular, the growing complexity of the modern world has signaled a paradigm shift in terms of how we manage our values and thoughts [3]. Such complexity is an ‘issue’ entangled with ‘relationships and interactions’ between people [3,4]. Various studies on complexity theory have shown that the complexity of social systems is a product of communication and interactions between people [3–6]. This means that it looks beyond a summation of how the thoughts, decisions, and actions associated with relationships between people make social systems complex, ill-defined, and uncertain [1,6–9]. Accordingly, exploring and then reframing different forms of relationships are crucial steps towards making intervention and change in social complex adaptive systems [5,10].

In general, communication and interactions in social systems take different forms [5,11]. Some types of relations are cooperative and some are competitive, but in the context of complexity, interactions between actors are more contradictory [5,10–13]. Such complexity is partly associated with the subject dependence of social systems and partly with the plurality of world views [1,14]. For example, when there are differences in values, people strive to use their own visions, and this increases the risk of conflict and disagreement between people [7,15,16]. Therefore, the focus of the reported research is on the concept of ‘conflict and disagreement’ as a contradictory form of social relationships.

Conflicts and disagreement can be found on different levels, from conflict at the organizational scale to tension between different nations, and it is often defined as a challenging form of social relationships. In contrast with destructive forms of controversy (e.g., tension or violence) that push a system away from its equilibrium state [3,17,18], ‘constructing’ them can create a unique condition through which a new order can emerge (e.g., change in the distribution of power) [19]. Regarding the construction process, its

literal meaning refers to the act of building something or putting together different parts to create something as a whole [20]. In social systems, however, construction refers to ‘the capability of a social system in aggregating a network of adaptive agents’ when they are at the edge of chaos [3,21]. This type of capability has certain applications; in particular, it can create a unique condition for ‘synergistic relationships’ or it can lead to desirable changes in ‘emergent properties of social systems’ [10,13,22–25]. Therefore, instead of merely seeing controversies as a destructive course of events (often leading to a removal action), it is essential to know how to rebuild controversies after the occurrence and to determine the steps required to implement them properly in a real-life context.

Learning from the limitations of system theories (e.g., dynamic theory and complexity theory), the prerequisite for answering these questions is to exploit theories and methodologies in the third phase of science (also known as the third culture of inquiry) [10,26,27]. The key feature of the ‘third culture of inquiry’ is to create actionable strategies and promote creative solutions that meet everyone’s needs’ [7]. Likewise, studies in the domain of design sciences have shown that such a ‘pragmatic and creative quality’ is embedded in the core concept of ‘designing’ [28–30]. In particular, design professions, as part of an ‘action-oriented discipline’, bridge the gap between abstract knowledge (e.g., theories) and concrete solutions, ideation, and the use of knowledge in a real-life context [7,31–33]. Therefore, the aim of this research is to introduce a new theoretical framework called “design-driven conflict(s)” that can lead to the necessary steps required to facilitate network construction in social complex adaptive systems.

### Objectives

Based upon the above research question and the aim of the study, this paper has four objectives (Table 1): (i) First, we aim to identify the underlying factors that are associated with conflict and disorders in respect to the complexities in social systems. (ii) Upon defining the origins, incidence, and different perspectives regarding the concept of ‘conflict’, we aim to clarify the reciprocal relationship between the conflict of agents and social change from a normative perspective. The intention is to investigate the mechanism by which controversies facilitate the emergence of a new reality through destabilizing underlying social structures. Next to that, (iii) we explore the steps required to construct conflict and disagreement by creating a network of interactive agents. (iv) Upon identifying the limitations and challenges associated with conflict construction, we propose specific aspects of design intervention (from a theoretical point of view) that ought to be beneficial in the context of social controversy.

**Table 1.** The review structure.

The Research Domains		The Review Structure			
Conflict(s)					
(i) Conflict of agent(s): A common phenomenon in social systems					
(1) Conflict studies	(a) The stereotypes about conflicts	(b) The definition of conflict	(c) The root cause of conflicts	(d) The consequences of conflicts	
(ii) Duality of conflict(s) and social change					
(2) Complexity studies	(e) Conflict & ritualism		(f) Emerging new knowledge		
Construction—Creating a network of allies					
(iii) Network construction, requisites, and challenges					
(3) Network construction	(g) Awareness (Knowledge from context)	(h) Beyond objective variables	(i) Boundary object(s) ecology	(j) Change in the ends and means	
The absence of a discipline	(k) Willingness for participation	(l) Complexity of actors & relations	(m) Uncertainty & complexity of context	(n) Synthesizing ideas & dynamics of conflict	(o) Creating trust & transparency
Design & Network construction					
(v) Design(er) potentials to intervene in social context					
(4) The domain of Design sciences	(p) Participate with heterogeneous people	(q) Making experiences tangible	(r) To frame fundamental values	(s) The potentials for empirical values	(t) To work in iterations

## 2. Materials and Methods

A systematic review of the literature was conducted to address the following hypotheses. First, ‘conflict(s)’, in a constructed way, facilitate desirable changes in underlying social structures. Then, ‘design’, as an agent of change through the creation of a network of interactive agents, can construct controversies in social systems.

To ensure the scientific quality of this paper, we conducted a systematic analysis using different academic resources and ‘four interdisciplinary’ fields of sciences, including conflict studies, complexity studies, network construction, and design sciences (from (1) to (4)) (Table 1). Furthermore, we conducted a ‘qualitative’ meta-analysis based on four successive stages that were originally developed by H. Levitt [34] as a tailored method to enhance the methodological integrity. As such, (1) the analysis began with a primary study within the scope of our research questions (i.e., what is conflict construction in a social system and which aspects of design facilitate the construction of a network of allies) and then continued with some essential modifications to the research questions based on the exclusion and inclusion criteria. Certain research elements, such as the type of study (whether it is included in at least one of the five research domains), date of publication (the majority were published after 1980), the intervention strategy (whether it refers to a socio-political or socio-cultural study), and the type of the publication (peer-reviewed articles or scholarly books and book chapters) were required. In addition to that, we excluded specific elements, such as studies at individual levels (in particular about conflict studies), as well as hard and soft aspects of system thinking. Next to that (2), we transformed the results of the primary research into the number of units and subunits that clearly supported the four research objectives (from (a) to (t)) (Table 1). This process helped us to generate a number of keywords, but it also supported categorization based on commonalities (or distinctions) with the abovementioned study disciplines (from (1) to (4)) (i.e., the selected keywords for the second review process were *constructive conflict*, *conflict management*, *social transformation*, *institution(al) emergence*, *higher order learning*, *network construction*, *sociology of translation(s)*, *boundary objects ecology*, *participatory design*, *value-oriented design*, *value co-creation*, and *system oriented design*). (3) To identify the essential keywords, we conducted a new search process in which we included scholarly works from research engines such as ScienceDirect, SpringerLink, Google Scholar, and Scopus (in total, 621 scholarly documents were found). The documents were imported into a reference manager software (Mendeley) for further analysis based on their titles, abstracts, and keywords. Next to that, we transferred the results into a new set of categories that had previously been created in five different excel sheets based on integration of the research objectives, keywords, and domain of studies. (4) Finally, this process reduced the literature list to 121 essential research items that had been examined carefully. Further, based on reading the bibliographies and references, we added 25 additional research items related to the scope of our review study.

## 3. Results

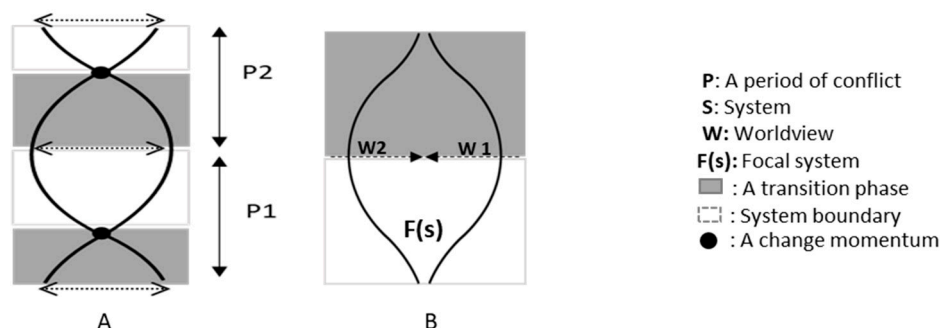
### 3.1. Conflict of Agent(s), a Common Phenomenon in Social Contexts

#### Definition and Root Causes of Conflict(s)

With regard to the consequences of conflict in social systems, organizations often define conflict as a problematic form of social relations that many agents, intentionally or unintentionally, seek to avoid [35–38]. This opinion is mainly manifested in positivistic approaches within organizational contexts [39]. The objective is to increase the efficiency of actors and their relationships with one another, support decision-making processes, and resolve conflict within the organization [40]. As such, they often have a linear problem–solution approach toward internal and external challenges. For instance, Shiflett [41] proposed a linear approach for analyzing the productivity in the organization by highlighting the negative impacts of diversity and conflict on group performance. Based on the Shiflett model, removing conflict within the organization can increase the probability of the resources being used [37,41]. Moreover, a number of studies have underlined the concept

of social conflict as a destructive form of social relationships that could negatively influence growth and progress at organizational levels [13,35–37,42]. Similarly, Cuppen [43] (p. 24) mentioned the concept of the ‘diversity paradox’ to illuminate how actors of a social system who avoid the consequences (e.g., lack of progress in decision making) of a conflict and disagreement often tend to have consensus-confirming discussions [44,45]. As a result of this stereotype, they often fail to reveal other aspects of the problem and lose the benefit of diversity [8,42,43]. Despite the consequences of controversies on group efficiency, the truth is that neither all personal aspects of perceived conflicts nor all social consequences of ruptures are problematic [12,46]. In other words, the impact of conflict (i.e., the resulting changes after conflicts) as a dynamic form of social relationships can also be “constructive” [18]. For instance, one of the advantages of controversies is that they can facilitate ‘exploiting the total intelligence of groups’ or reduce the risk of ‘group thinking in an organizational context [43]. From a broader social perspective, controversies can also contribute to ‘learning and capacity building’, which is essential for ‘change in the deep cultures and values’ (the concept will be explained in the next section) [17,44].

Moreover, the review of the literature showed that, in social systems, conflict(s) between human agents is an essential property of human relationships that ‘stimulates’ the dynamic nature (self-organization property) of the social system [8,46–48]. It is a common consequence of human life and a necessity for continuous growth in every society [12,13,46,49]. In the short-term, controversies shape the individual’s decisions, behaviors, or actions. In the long-term, by challenging the dominant culture and opinion (also known as a social reality), they can increase the speed of growth in a social system [21] (Figure 1). As stated by J. Gharajedaghi [11] (p. 104), ignoring the role of conflicts in a real context reduces the independence of people and their agency to a robotic level. Therefore, removing controversies or “the ideal of a conflict-free society not only is not feasible, but it is not even desirable” [11].



**Figure 1.** Controversies are an essential property of social relations that facilitate self-organization and stimulate growth and progress in a social system. Figure (A) shows how controversies facilitate the transition and growth by creating momentum(s) for change, and figure (B) provides a detailed perspective of changes in controversies themselves from one momentum to another.

Regarding the origin of conflicts, in an early study, Coser [50] (p. 201) divided the sources and incidences of conflict into four categories, including the distribution of power, wealth, resources, and achieved identity. Collins [51], in a study on ‘black feminist thoughts’, highlighted the linear relationships among different parameters that lead to oppression and tension in marginalized groups, including the relationship between the power and distribution of resources and then the impacts of different value systems, i.e., just ahead of human natural drivers on knowledge validation. Based on Collins’ study controversies, in the present form, are a product of past events, in particular, the way that power is distributed. Similarly, L.B. Bratton [46] divided the origin of conflict into three main categories, including power differentials, scarce resources, and value divergence. In contrast with such linear (systematic) approaches, Callon and Latour [52] tried to go beyond systematic approaches. Their concept of “translation” by decentralization of “power” (or capital) gives more agency to the role of actors and their network of relationships. As

outlined by Latour [53], ‘translation is a prerequisite for transformation’ in social systems. Through the translation process, social realities, including the interest of actors, can be modified differently. This means the divergence of interests is more about the process of translation, rather than transformation [54]. Moreover, Ackoff [55] and Gharajedaghi [11], based on a review of early social thinkers, such as Marx, Weber, and Bagdanov, defined the root cause of controversies from a systemic point of view based on a ‘network’ of five elements, including wealth, beauty, power, value, and knowledge. From this viewpoint, any changes in the ‘dissemination and distribution’ of these resources can destabilize the power relation [56]. Despite the importance of having a multifaced approach, a number of studies have shown the differences in individuals’ values, expectations, and thoughts as a prime source of conflict and disagreement [18,57]. From this perspective, value divergence between people leads to more contradictions, and this increases the risk of conflict and tension [43,46,48,58,59]. Accordingly, controversies can be reproduced from the interactions between certain elements (actors and actants), including people and their object of interest, the spillover of past events (e.g., divergences in hidden variables and opinions), and power relations in a social system. In the next part, in response to the second objective of the paper, we discuss the ‘mechanism of controversies’ and the way that conflict accelerates the speed of (desirable) reforms in social adaptive systems.

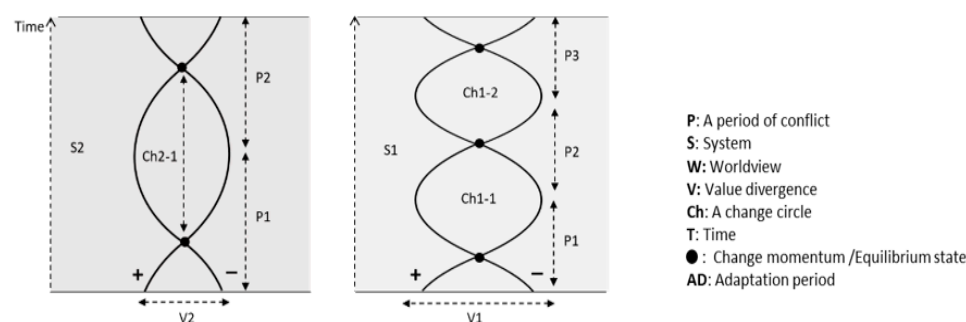
### 3.2. *The Duality of Conflict(s) and Social Change*

#### 3.2.1. Conflict(s), Fixation, and Ritualism

In general, the mechanism of change in social systems is a gradual process. The process is often entangled with an internal feature of social systems known as self-organization. Self-organization refers to the continuous emergence of patterns and orders and ensures the continuing adaptation of the system when dealing with external challenges [60]. Based on this feature, ‘social changes’ are normally a gradual and continuous state of reform in which normative factors ‘gradually’ change the dominant discourse and social equilibriums [61–63]. For instance, reframing social structures, changing the status quo, and even shifting the values or norms by reframing patterns of relationships all lead to such changes in the long term [12,62].

Despite this, shortening this process requires ‘effective’ changes in the default ‘values and mindset’. These stable variables (e.g., ethical aspects of life) act like a barrier that forces people to stay in their normative zone while strongly relying on their deep values and mindset. Such core values are socially constructed through the interactions between actors. Any changes in these values require a social mechanism [21,64] that is potentially embedded in the core concept of conflict as a form of social relation. The same argument about the controversies was clearly outlined by Mattingly et al. [65]: “the moment of confrontation, which may evoke in us disquiet (p. 483) and bewilderment, uncertainty, and confusion is the moment of [ . . . ] change in the moral and ethical aspect of life”. In such a situation, our premise is (re)constructing an internal tension by the declining risk of ‘fixation or ritualism’, which can not only ensure the continuity of systems but can also increase the speed of reform [50,60,66]. Figure 2 shows how the divergent values [V1 and V2] decrease the distance between two momenta and how upgrading the level of tension can increase the speed of reform. Therefore, in contrast to the self-organization nature of social systems, controversy, as a form of social relation, can act as a fuel that triggers the speed of reforms [21] (p. 123). In other words, the success of reform, i.e., the extent to which changes reframe the dominant discourse and the rate of the changes (i.e., how long it takes to reframe the existing system and boundaries) are entangled with controversies as a process of change [12,60]. In the next part, to further unfold the process and the consequences of such changes, we examine the relationship between the outcome of conflicts (higher-order learning) and the emergence of a new reality.

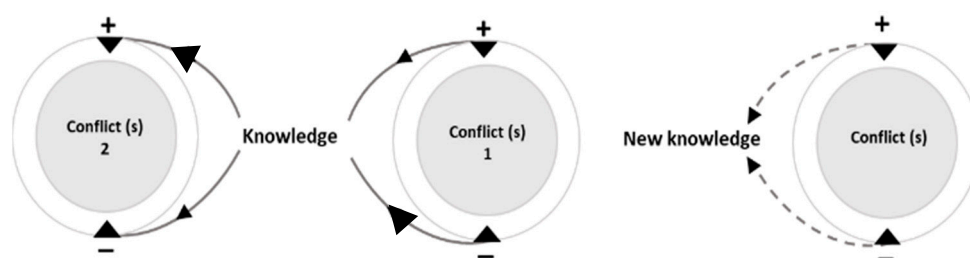




**Figure 2.** Conceptual visualization of controversies in social systems: the speed and rate of transformation are subjected to time and context and are entangled with the outcomes of conflict as a process of change.

### 3.2.2. Conflict and Emerging New Knowledge

Regarding the process of change, the ‘initial’ or fundamental outcome of conflicts could be certain phenomena, in particular, the creation and transmission of ‘new knowledge and wisdom’ (Figure 3) [43,44,50,67]. In social systems, knowledge is not necessarily information. It is “the fact or condition of knowing something through experience or association” with others [68,69]. In other words, knowledge is ‘socially distributed’ and tightly entangled in the way that a new reality (i.e., roles, responsibilities, or any form of activity that shapes an institutional order) is constructed in social systems. Regarding the relation between reality and knowledge, Berger and Luckmann [21] defined the concept of reality as the quality of phenomena that we recognize independently of our own volition and knowledge as the manifestation of that reality in every aspect of our social lives. Learning from the organizational theories, the bridge between that reality and the transmission of new knowledge is a change in ‘deep culture and values’. These values, known as vertical culture, refer to the types of values that we are brought up with from an early stage of our life. One key feature of these values is their implicit nature, in particular, for keeping people socially together [70]. In this case, new activities in a social context (e.g., practices, behaviors, and relations), before emerging physically, need to be manifested in the culture of people [38,71,72]. For example, the concept of democracy as an emergent property of a social system must emerge culturally before emerging physically in real life. [13,73]. The relation between deep culture and social change has been mentioned clearly in the system dynamics theories as well, mainly as a powerful leverage factor (or critical point) that can create a mindset or paradigm shift in a social system [74,75].

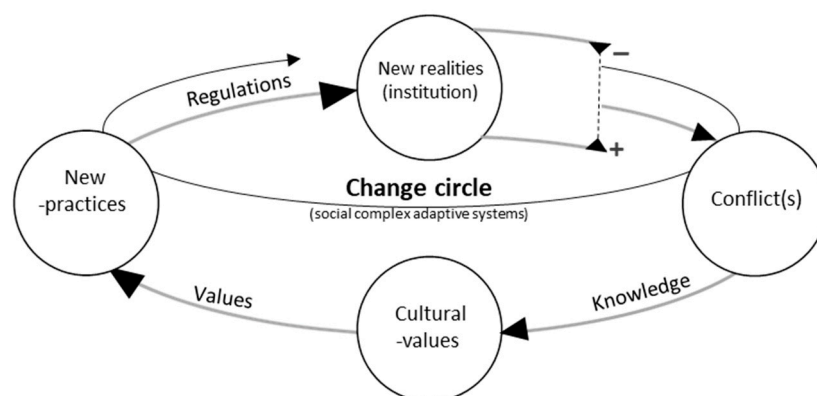


**Figure 3.** Knowledge that originates from the process of conflict is like a fuel that increases the speed of reform. By challenging the dominant realities, such knowledge in social systems can create the possibility for the emergence of a new order.

Despite that, in theory-knowing cultures, decoding and encoding the values is a highly difficult process [17]. Cultural values, particularly those associated with vertical culture, are harder to change than any other variable in social systems. They are the prime source and equilibrium of social structures and make systems stable and resistant [50,61,63,73,76]. Speeding up the transmission of culture, in particular, with regard to values and assumptions, requires a ‘stronger trigger’ or ‘internal stimulus’ [70,71]. Our premise is that the

“conflict(s) of agents” can be identified as an internal stimulus that triggers such changes. As stated earlier, the revolutionary mechanism of controversies facilitates the essential changes in deep culture(s) and values. For example, a historical review of early societies revealed how different forms of human–human relationships, in particular, conflict or contradictions, can shape a new space of action [52,77], such as developing a new writing style, bookkeeping, or even accounting after a clash of early nations (i.e., by overcoming their computing capabilities), which can accelerate the transmission of a new culture [13,49,78–80]. As a result of this transmission, there is not only the emergence of new behaviors, actions, and relationships, it can also shape constitutions, roles, and regulations between social actors (i.e., they are the manifestation of social reality) [67,71,73].

Accordingly, while increasing the system’s diversity is a necessary step toward adaptation, controversies between actors can also open more room for knowledge transmission at a higher order (also known as third-order learning) [43,47,50,81–83]. On one hand, knowledge results from conflict (as the common and initial outcome); on the other hand, the probability of having more conflicts within a system with intersecting values [21] makes conflict an effective instrument of change for deep culture [17,38]. Notably, as stated by Quist [84] (p. 1035), a ‘critical’ discussion between actors often leads to the creation of new knowledge, not only on the cognitive level but also with respect to values, attitudes, and underlying convictions. As such, conflict is potentially the ‘agent of change’ (or an actant) that has the ability to alter the situation, particularly through the transmission of higher-order knowledge Figure 4 [85].



**Figure 4.** Circulation of change and adaptation in social systems. Conflict, by diffusion of new knowledge, becomes an agent for the change in deep culture and culture. By reframing values, it becomes an agent of the change to new realities (e.g., emerging new institutions) in social systems.

Despite this, the success of conflict (as a process of change), i.e., whether it has created new synergies or not, is partly about the rigidity and resistance of culture but also about the effective utilization of conflict and disagreement [38]. In other words, the process is not always straightforward; a conflict and the associated changes (from values to the new relationships) may fail to achieve their desired outcomes if the transition into the new institution does not occur within a specific time and context. The problem is relatively political [54]. It is related to the distribution of knowledge (as a process) and the consequences of that transmission in a new context.

For example, human knowledge is often defined as an instrument for survival and power. Two societies confronting each other with different realities both distribute knowledge in a way that supports their own definition of reality [21]. The one with more power has a better chance of imposing its own definition or manipulating the outcome of the process in a different way. Regarding the issue of power, Collins [51] clearly unfolded the difficulties of black feminist scholars in the face of Eurocentric masculinist epistemologies, wherein the hegemonic nature of white male epistemologies decreased the influence of black feminist thought through Afrocentric feminist epistemology. In other words, although oppression created the possibility for the emerging new order, it never scaled up as

expected. Thus, there is no doubt that controversy, as a dynamic process [54], contains a series of actions and decisions that happened in the past (in relation to what was important for people), continue in the present (in regard to power relations), and alter the future. Learning from a futuristic discipline (e.g., design sciences), the future can be socially constructed by the creative use of the assets of today [79] in a way to create (new) synergies between opposing realities.

In doing this, what is required is a ‘**constructive form of conflict**’ or, as stated by Knight [85] (p. 296), a ‘strategic form of conflict’ [17,85]. The construction could result from certain steps: preventing the destructive impacts of conflicts (e.g., as physical or verbal tension) [18], redesigning a new network of conflicts [54], or even rebuilding the future after conflicts [67,86]. In particular, the focus of the next part is network construction under the condition of conflict and disagreement. Our premise is that construction processes, along with utilizing the creative and productive function of controversies, are necessary for meaningful changes in the dominant discourses [87]. As such, in response to the third objective of the paper, we further investigate what steps are necessary and how these steps could be implemented properly for the effective utilization of conflict in a social context.

### 3.3. Network Construction, Requisites, and Challenges

As concluded in the last section, despite the relationships between conflict(s) and social transformation(s), there is no guarantee that the diffusion of new knowledge from conflicts will lead to ‘desirable’ changes in the dominating mindset and paradigm of a system [17,21,38,61,85]. In particular, the problem with a diffusion model is the ‘initial force of those who have power’ [77]. Rather than what has been transmitted or where the transmission occurs, the displacement of a token (which in our case is social knowledge) refers to the power of a particular actor who has power that is either greater or different [56]. In contrast to the diffusion model, Latour [77] mentioned the role and agency of individual actors in shaping a token. Based on the translation model, a shift from the transmission to the continuous transformation of a token is happening (which, in our case, represents higher order learning) only by the decentralization of power. In other words, the prerequisite for obtaining higher-order learning (from the process of controversies) is taking into account the ‘power of association’ [77] or a collective action that has been rooted in the notion of a network of interactive agents. Therefore, to conceptualize the effective inclusion of conflicts in a context of controversy, two steps must be reviewed: first, what the construction of a network of controversies is, and, second, how to utilize (instrumentalize) the conflict between actors in a meaningful way. The former requires a review of the literature based on social science theories (i.e., both structural and systemic viewpoints), and the latter requires a study on decision-oriented discipline(s) in particular design sciences [32,67,88].

To start with, network construction refers to a process in which a set of human and non-human agents becomes related and is converted into a set of collective agents [52,54]. In line with the process, we highlight four essential steps associated with the construction of a network of controversies. The steps should not be seen as a linear process (a framework or method); instead, the focus has to be on the research dimensions, in particular, the complexity that each step encompasses.

#### 3.3.1. Obtaining Knowledge from Context

The first step is obtaining knowledge about the context (i.e., context refers to a controversial situation). As long as the context is not overly complicated, knowledge about the context can be conducted through analytical studies and by defining the emergence and incidence of conflicts [18]. Among the key questions that need to be answered are the following [18]: What is the incidence of conflicts? Who are the actors and actants of the system? How are they connected in a dynamic context? What are the impacts of controversies? Addressing these questions requires a consciousness or awareness of different world realities (e.g., cultures) [67,89–93], but also a transparent (critical) discussion between actors that can further facilitate the unfolding of the unknown side of the con-



text [89,94]. Prior research has shown that knowledge about the context in earlier phases of construction can prevent ‘unfair judgment’, ‘misinterpretation’, or ‘oversimplification’ of the problem [63,88]. In particular, when people have value conflicts, a misinterpretation (which is often associated with bias or unfair judgment) can escalate the negative impacts of the tension (e.g., physical or verbal violence) [17,94]. In addition to this, having prior knowledge about the context is essential for knowing power relations, tracing influential positions, and hearing marginalized voices [54]. A study by S. Hussein et al. [95] revealed that while understanding different ‘social hierarchies’ is a prerequisite for better engagement, a lack of such knowledge about the context(s) prevents actors from participating effectively. Therefore, by knowing each actor’s position and analyzing them within the network [54], we can increase our awareness or build background information about the context, which is an essential step for network construction.

### 3.3.2. Beyond Objective Variables

The second step is to define a context beyond objective variables [67]. Despite the necessity of awareness for framing a context, attributes of a context are not always sequential and simple [18,96]. Some attributes are dynamic and ever-changing (e.g., subjective differences of actors) [18,52,97]. Moreover, the context is not an isolated entity [54]; there might be some external variables (e.g., rules and regulations in neighboring systems or conventional and new forms of media) that influence the temporal dynamics of a conflict [18,52,77]. Notably, E. Cuppen et al. [18] conceptualized the concept of ‘controversy spillover’ to illuminate the impacts of external variables in shaping the attributes of a context. Based on their study, controversies in one social system can influence the dynamics of the context in another social world [18]. Accordingly, once the context has been defined as a complex entity, rather than merely seeing the controversies in a linear way, the requisite is to see the ‘relations’ between controversies as an ‘object of interest’ [18]. One benefit of seeing the relations is that the authorized agents (e.g., policymakers, organizers, or entrepreneurs) can create a situation of ‘problematization’, in which issues can be (re)framed by actors in a dynamic manner [18,52].

To conceptualize the ‘problematization’ process and its relation with network construction, M. Callon [52] proposed a ‘sociology of translation’ wherein he explained four ‘successive’ moments of translation (starting with problematization) toward framing a network. For Callon and Latour, framing a context requires the flow of objects to be seen from different viewpoints. While this process gives more agency to actors, in the end, this is an ‘obligatory passage point’ (i.e., often defined by one viewpoint) that facilitates the creation of a network of ‘alliance’. This means, through a problematization process, that allies (either external or internal actors) become part of the network if, and only if, they follow the obligatory passage points [52,67,82]. Despite the benefits of problematization for creating a network of actors (i.e., in relation to the dynamics of context and employing a broader community of actors), the limitation is the issue of power. Problematization will narrow down the construction process based on one specific viewpoint [97]. In this case, beyond creating a network of ‘alliance’ through such a problematization process (i.e., starting with involving actors and ending with obligatory passage point(s) that are assigned with one actor), an ecological or holistic approach is required to create a network of ‘allies’ in which actors have more agency to make their own decisions [25,96].

### 3.3.3. Boundary Object(s) Ecology

Subsequently, the third request is about creating ‘boundary objects’ from which the knowledge and opinions of actors can be ‘translated’ in a meaningful way [57,97]. In particular, boundary objects can be effectively used to create a network when contradiction and differences among actors are at a high level [57]. Considering that translation is a co-evolving and progressive process (e.g., transmission of thoughts), creating a boundary object can facilitate the transcendence of the (potential) social world among actors. Finding commonalities and crossing boundaries between different social worlds are essential fea-

tures of boundary objects [97]. The concept was originally developed by S. Star [97] (which was originally a response to M. Callon's [52] four moments of translation model) to illuminate how entrepreneurs (e.g., a science authority) can create a common ground between contradictory voices by encountering different social worlds [98]. Based on Star's [97] studies of 'creating a network of allies' rather than mediating the concerns of actors from a specific point of the passage (alliance), it is the role of individuals (allies) to maintain the integrity of the interests of the others [97]. Moreover, giving more agency to actors will empower them to articulate a greater range of discourses [67,99].

In such a situation, besides involving a diverse range of actors [43,57], a further requisite is to have a balance between them to facilitate a transparent discussion [43]. Such diversity, along with an open, unbiased discussion between actors (e.g., inclusion of marginalized voices), leads to the unfolding of more hidden assumptions, a higher proportion of unshared knowledge, and a better translation situation [100]. Thus, utilizing boundary objects, crossing the contradictory voices by using their commonalities, and creating a condition for making controversies (as a form of relationships) more participatory are the advantages of having a holistic viewpoint.

Our premise is that this should ideally lead to construction since, on one hand, it can provide a situation of social learning that gradually changes the predominant mind-set and paradigm within the system (through a different moment of translation) and on the other hand, it can lead to the strength of the network being maintained with a long-term perspective.

#### 3.3.4. The Interchangeable Notion of "Ends and Means"

Next to creating a participatory context through boundary objects, the fourth request is about utilizing the interchangeable notion of "ends and means". Ends are "possible states of affairs, which someone values for their own sakes" and means are the things that make pursuing that ideal end a desirable experience [101]. As we gain distance from a fundamental view (in which analysis is one essential step), for people such as H. Frankfurt [101], rather than knowing what drives people to act in a certain way, it is more about seeing the duality of a relation between ends and means among people. One benefit of this approach is turning a context of controversy into a more competitive form of engagement [11].

To serve such an active and competitive relation (which is essential to obtain the benefit of problematization), it is also essential to create an 'interactive' context [102]. An interactive context increases the transparency of communication among actors. For instance, people who engage without any preplanned intentions often have to deal with the temporal dynamics of conflict [18,44], and this requires transparency in the first place. In this situation, the creation of an interactive context by facilitating the exchange of values can increase the transparency of the context. The creation of an interactive context can also support actors to share their opinions, challenge the dominant discourses, and reframe (by negotiation) the boundaries among each other [43,103,104]. Moreover, one benefit of such an interactive approach is having a problem-structuring dialogue [43,44,105] which is essential to increase the effectiveness of deliberation in handling the temporal nature of conflicts [104]. Therefore, through these processes (making a controversy context interactive, and create a problem structuring approach) the contradiction between people can turn into a competitive form of engagement wherein people can not only learn from each other, but they can also utilize their thoughts and opinions through the exchange of their interests.

#### 3.3.5. The Absence of a Discipline (Analytical, Synthetic, Complex, and Relational)

In sum, the abovementioned steps are necessary but not enough to construct conflict in a real-life context. Prior research (with more practical implications) has shown that these steps have brought some challenges since they do not clarify the kinds of interventions needed, and how we can design for them [44,106,107].

For example, when there are diverse actors, the facilitator is often confronted with a sea of meanings, aspirations, and convictions which makes synthesizing and sorting ideas a highly complicated process [82]. Another concern is about the willingness of actors and their right to participate in the first place [87], which refers to the issue of power. In particular, such a problem is more common when one actor takes a position that belongs to the other authorities (e.g., in the problematization process, defining the obligatory passage points is a researcher's responsibility). Therefore, the issue requires a creative approach to change the power relation and include marginalized actors within the network [87,104]. In addition, creating an interactive context in order to deal with (lack of) trust and transparency requires an 'iterative' mindset that gradually increases trust and transparency between actors [11,67].

All of these problems, along with the necessity of having an action-oriented participatory bias, require an additional approach for conflict construction [99]. Such a participatory mindset has to create actionable strategies to facilitate emerging new values between contradictory voices [104,108]. Thus, in the following sections, in line with the fourth objective of the paper, we examine specific aspects of **design inquiry** in order to illuminate how a 'designerly intervention' can facilitate conflict construction in a complex adaptive system.

### 3.4. Design(er) Potential to Intervene in a Socio-Political Context

In general, the implications of designed objects and environments are partly functional (explicit) and partly socio-political (implicit) [109]. Prior to publicizing an artifact in a real-life context, designers often attempt to unfold the unwritten social aspects of their designed objects [110]. Their intention is to see the consequences of the designed object from a broader social perspective. Such a dimension of design has been discussed in a few studies, mainly at a methodological level [111,112]. In particular, Sims [112], in a study about the politics of design, mentioned three main capacities of design for political implication: the 'prescriptive', 'publicizing', and 'proposing' notions of design. The prescriptive feature is relatively similar to the translation processes. Based on this aspect of design, a designed object can be translated from a socio-political concern (e.g., the issue of poverty) into a technical problem (e.g., internet connection) [110,112]. In contrast to the prescriptive features, the 'publicizing' aspects of design have more social implications, aiming to make a complex political problem graspable or publicizing it for a broader community of actors. The third aspect refers to the futuristic implication of design. The intention is to 'propose' an alternative future through the involvement of multiple actors (each actor proposes a different reality), and the objective is to decrease the risk involved in making a decision in the political context [110]. Despite having certain methodological advantages, the problem with such approaches is the lack of theoretical bases to support the underlying argument for the benefit of the design contribution. In other words, it is hard to find an analysis based on the first insight of design interventions. For example, regarding the translation process (prescriptive aspects of design), unfolding the relevance of design requires a normative investigation. The same concern is applicable to envisioning a collective future, which requires an investigation based on the participatory roots of design.

Accordingly, similar to the last section, the steps presented here do not aim to present a methodological contribution; rather, the objective is to explore the theoretical contribution of design for construction in social systems.

#### 3.4.1. Design Potential to Participate with Heterogeneous People

Starting from the idea of community building within the decision-oriented disciplines (e.g., applied engineering, business, and marketing), designers are traditionally more inclined to involve actors in their intervention processes (e.g., customer surveys, focus groups, or field tests) [32]. They have a great tendency to engage closely and to empower actors from micro to macro levels to share their knowledge and experiences in a meaningful way [91,104]. Such a tendency is partly related to their desire to (co)create a better future, i.e.,

improve the quality of human life [58], but it also shows their propensity for human-driven solutions [99,109].

In particular, participatory approaches in the domain of design are aimed at creating a more explorative and reflective mode of inquiry by involving a broader community of actors [104,113]. Through participatory sessions, designers utilize a variety of (participatory) tools and techniques in order to facilitate a critical discussion that ideally leads to the exchange of more meaning and values among actors [25,104,114]. The participatory notion of design, along with the creative use of tools and techniques, can create a unique condition for knowledge transformation that is similar to the core concept of ‘boundary objects’ [89,97]. A study by A. Van Boeijen [89] showed that designing a set of cards (i.e., culture-sensitive cards) assists the designer to examine the culture of the intended user, and it can serve as a condition for creating boundary objects from which the designer’s work will receive more credibility among actors. A similar study by F. Smulders [115] showed that prototyping with or for stakeholders by bridging the gap between research and the production context facilitates a better understanding of the design process. Thus, prototyping processes, along with the creative use of tools and techniques (e.g., cards, probes, or dairies), are great examples of bridging different social worlds [115–117]. The creation of the essential condition for the formation of the boundary objects and then utilizing the participatory tools and techniques enlarges the potential network construction.

### 3.4.2. Design Potential to Make Experiences Tangible

The second advantage is the value sensitivity or sensemaking power of design. A design intervention, as a value-oriented approach, facilitates the definition and (re)framing of values in order to obtain meanings for their desired outcomes [91,109]. Design facilitates, by challenging people’s deep values and assumptions, the creation of tangible knowledge and experiences [99,117,118]. Studies have shown that the way designers intervene in a complex context is not limited to their intellectual abilities, nor is it simply related to linear relations of (predefined) variables within the context, but it extends to the competent use of values for the benefit of people and society [30,104,119]. In particular, different approaches in design practice embrace the role of values in shaping human social systems (e.g., design for sustainability or design for the base of pyramids) [64,111]. Similar to the design context within the domains of social sciences, the act of constructing a network is tightly entangled with making sense of the context. Whether a controversy context is simple or complex, knowledge about the context, how values influence people’s relations, and determining the kinds of values that are stable or unstable are among the key questions that need to be addressed for the construction of a network [18,57]. Our premise is that the value sensitivity of design, along with the use of designerly tools and techniques, facilitates network construction. In the following text, to explain the concept in detail, we further explore four aspects of design, i.e., the design capacity for framing fundamental values, empirical values, values that result from iteration, and situational values that are meant to be instrumental for the act of framing a network of actors.

- Design potential to frame fundamental values

First principles, or widely accepted principles, are fundamental values that cannot be reduced to other assumptions (i.e., they refer to ethical values such as security, respect, love, or kindness) [65,109,120]. These values influence actors’ attitudes, define fairness, and legitimize what is right or wrong about an action (Intrinsic vs. Extrinsic Value, Stanford Encyclopedia of Philosophy) [121,122]. Likewise, in the design process, knowing these values (i.e., design of being or intrinsic values) is one of the essential steps that designers need to implement them in a real context [104]. From the early stages to the final stages of design, designers often struggle with the ethical question of what is the right things to do, or even more deeply, what is fundamentally important for humans? [114,123]. Without certain knowledge and abilities about these values, designers cannot understand why (and how) people act and interact with one another in different ways [27,89]. In this case, they often deploy a thorough and in-depth assessment of the context in order to reveal these

values [82,124]. They use a variety of tools and techniques and utilize their design ability to distinguish values from other related concepts (such as needs and attitudes) [117,125,126]. In particular, by consciously using the culture of the intended user, they can assure that their artifact(s) have been accepted in a specific social system [89,120]. A study by R. Price et al. [125] showed that designers can surface deeply held assumptions and synchronize different thoughts among actors by using narrative tools and techniques. These tools, along with design abilities (i.e., using creative techniques to frame socially accepted values), bring more clarity for intervention and change in a social context [33,127]. Considering that one essential step toward network construction is knowing fundamental values (which require obtaining knowledge from context), the use of such design abilities to unfold fundamental values has a certain benefit by increasing the feasibility of deliberation in a complex context [25,126].

- Design potential for empirical values

In contrast to the fundamental values, studies have shown that a design process is not just about applying pre-defined values, it is also about utilizing empirical values and related knowledge. Empirical values refer to values that have more potential to be tested in a real context, such as concepts of usability or the affordability of a designed object [28,117].

In particular, certain values associated with the design process get their meaning through real-life experiences [27,128]. Similar to instrumental values, they are grounded in daily life and it is hard to separate them from human practices [30,119,129–131]. Unfolding these values requires an empirical investigation, along with a pragmatic mindset, similar to the core concept of design [27,109,130,131]. Based on the pragmatic notion of design, a designer does not define an object merely based on its inherited values (what it is being used for) but also based on ‘how it ought to be’ in order to help the user achieve a practical, yet meaningful, end [105,119,131,132]. A study by I. Dianat et al. [133] in the context of masonry work showed that the way designers shape (handle) tools has a significant impact on how a product is being used in a real-life context (e.g., user performance, usability, and discomfort). In order to obtain a functionally better end, besides subjective attributes, a designer often investigates the practical implications of their values [133,134]. Through this process, they often use different tools and techniques to better investigate the application of their values. For example, the purpose of ‘a system usability matrix’ or ‘affordance structure matrix’ is to evaluate the usability or affordability (as an instrumental value) of artifacts in a systematic way [25,99,117,118,131]. Such investigations can be conducted individually or in a collective way. For example, by employing different playful techniques, one can aim to provoke a reflective form of deliberation wherein actors can share and experience the practical outcomes of their artifact in a real context (e.g., by prototyping with stakeholders) [104,117]. Such a pragmatic mindset along with a systematic approach for processing thoughts creates a unique condition to test and validate the results of an intervention [27,104,105,128]. Considering that one of the main challenges toward (co)creating a network of actors is having actionable strategies, such a pragmatic mindset not only can create a unique condition for connecting people in practice but can also lead to more trust and transparency toward the process and results.

- Design potential to work in iterations

A design intervention is neither entirely synthetic, nor is it entirely analytic. The third advantage of the design is its iterative circle. From understanding to action and from the production to the use of knowledge, the design process is a learning circle [22,132]. Designers utilize both analysis and synthesis techniques in an iterative way to increase their own understanding of the situation as well as to ensure the effectiveness of knowledge and experience [30,124,135,136]. An iterative process requires a dynamic culture (i.e., moving back and forth between problem and solution space) from which designers obtain meanings of their values through iteration and by reflection on others’ thoughts and opinions [120,124,125,133,135–138]. In addition to that, an iterative circle makes design interventions suitable in the treatment of emerging phenomena, such as destructive



conflict [30,107]. From a social systems perspective, one advantage of continuous iterative insights is to yield a greater understanding of the problem and a better sense of the whole. Moreover, a design intervention is like a reverse zoom lens through which designers see the system as a working part of a successively bigger and bigger picture [11]. Thus, having an iterative culture leads to more trust and transparency both about the process and results in a broader sense [73,83]. As stated by J Ghardajgi [11], subsequent iterations (which are embedded in the design process) help to assure trust in the consistency of the process as well as to generate knowledge related to the complexity of the context. In this case, the third advantage of a designerly intervention for network construction is to obtain a bigger picture of the context, learning from failures, and generating new knowledge through an iterative circle of inquiry. Such a co-evolving and progressive process can create more transparency as well as a sense of conformity among actors and facilitators through the construction process.

- Design potentials for holistic approach

The fourth advantage of design is embracing the complexity of a system as a whole and obtaining a futuristic (opportunistic) approach toward intervention and change. A design process is neither entirely about framing a set of elements, nor is it fully about arranging them in order. It is more about how to 'organize' the properties of a system as a whole [30,119]. Studies have shown design thinking is a complex process that has a great capacity to handle complex situations [30]. Regarding the complexity of design thinking, based on Rittel's wicked problems principles, R. Buchanan [28], claimed that most 'design problems' are implicitly 'indeterminate, ill-defined, and complex'. From this perspective, the complexity of design thinking is not a prerequisite for better design. It is at the core of what it means to act as a designer in a rational, designerly way [99]. In a complex context (e.g., social systems), the designer employs a holistic and complex mode of inquiry in order to frame the problems in a wider context and support the dynamic notion of design (i.e., moving from whole to parts in an iterative circle). As stated by K. Dorst [137], design experts, rather than solving a problem in the given format, often (re)frame a problem in a wider context. In such a situation, the role of the designer is similar to the concept of 'translator' in Latour's [77] 'power of association' (social science), wherein a designer, as an organizer, can increase the credibility of the proper values through the power of association (people) and the connections between actors [131]. In this case, the essential approach is to 'connect' the components of a system in a meaningful way in order to make sense of a complex context [99,138]. In contrast to other aspects of design, in dealing with complex problems, tools and techniques are also relatively complex, relational, and 'kaleidoscopic'. For instance, designers use the idea of Synthesis maps or Giga maps in order to connect the components of system but also to embrace the complexity of actors and relations in a meaningful way [139–141]. Through these mapping processes, designers have different choices when intervening in a system, and with each choice, a new paradigm gradually emerges [75,142]. Therefore, the complexity of design thinking, along with having a holistic-opportunistic approach toward complex problems, makes a designerly approach highly appropriate for intervention and change in a complex system, wherein actors and the context operate under conditions of uncertainty and vagueness [22].

### 3.4.3. Concluding Remarks

In sum, from a theoretical standpoint, four elements of design, along with the participatory notion of design, have certain advantages for constructing a network of actors. In particular, through value co-creation (i.e., from highly fundamental to pragmatic and relational methods), design can create a unique condition for transcending a current situation into a desirable future from which knowledge and experiences can be created through the relations between actors [23,143]. In this case, the integration of the aforementioned aspects of design (fundamental, pragmatic, reflective, and kaleidoscopic notions of design), along with the design tendency to empower actors to co-create value in a complex context, has a great capacity to construct controversies in a social system [109,117,131]. In the next

part, after a short synthesis of the aforementioned insights, we discuss the essential steps that should be taken for the implementation of a designerly intervention in the network construction process.

#### 4. Discussion

Undoubtedly, controversies are a common and ever-changing phenomenon among actors in social systems. Our review shows that, regardless of stereotypes about controversies, which often come from a consensus-building mindset in organizational contexts, the construction of conflicts between contradictory voices has a certain impact on the speed of reform in a social system. In particular, conflict itself could be identified as a strong trigger or agent for change in underlying social structures. The outcome of conflicts, i.e., the diffusion of new knowledge from conflicts, is a true representation of ‘higher order learning’ as it facilitates transformation in the dominant discourse and social equilibrium. However, the process is not straightforward, nor is there any guarantee that such transmission will lead to desirable changes. In particular, the concern is power relations, wherein one authority might impose his/her own definitions. Learning from B. Latour [77], the requisite is to reframe the model from a diffusion approach into a translation model. In doing this, we highlight one possible way to construct controversies, conflicts, and disagreements: the creation of a situation of social learning between contradictory voices. One way to create such a condition is to construct a new network of allies wherein actors are willing to share and exchange their meanings and values in a meaningful way. Based on the results of the review, depending on how complicated a controversial context is, certain steps are required to create a network of allies, including (1) obtaining knowledge about the context through analyzing the actors, variables, and incidences of controversies (i.e., appropriate for simple context); (2) defining the attributes of a context in a dynamic way by transferring the attention from the controversies themselves to the relationships between controversies as objects of interest (i.e., appropriate for complicated contexts); (3) creating a boundary-object ecology from which knowledge and opinions between actors can be translated in a meaningful way (i.e., appropriate for simple to complex contexts); and finally, (4) creating an interactive context wherein actors are willing to exchange their meanings and values with each other without threatening the object of their interests (i.e., appropriate for a complex context). Our premise is that involving actors in all these steps, along with maintaining the continuity of translation between opposing opinions, can create a unique condition for mindset and paradigm shift in a social system. As we stated earlier, inherent in all these steps is the high complexity of actors and the complexity of relations (e.g., power relations) between the contradictory voices [1]. To ensure that such complexities are understood and treated properly, the requisite is to have a multidisciplinary, action-oriented approach [144]. This approach has to be tailored in a certain way not only to maintain trust and transparency between actors but also to unfold hidden values and assumptions between opposing opinions. Additionally, employing creative skills is an essential step in order to encourage actors’ active engagement in the sensemaking process. In this case, ‘design interventions’ are due to certain advantages, including (1) the designer’s tendency to be involved in the community (i.e., this refers to the participatory roots of design); (2) design abilities in sensemaking in a complex context (i.e., making experiences tangible); (3) (4) the design(er)’s potential to frame fundamental and empirical values (i.e., value sensitivity of design intervention); (5) the design’s tendency to work with a progressively bigger and bigger picture (the holistic and iterative notion of design); and finally, (6) the designer’s ability to frame problems in a complex situation, which makes a design intervention highly appropriate for creating a network of actors in a controversial context.

To leverage the theoretical insights and to facilitate design interventions in actual contexts (i.e., it has to be applicable in relation to controversies at the technical, organizational, institutional, and social levels), the suggestion for future studies is to use an actionable methodology (or design framework). One essential aspect of this methodology is to address multifactor and multidimensional aspects of complex problems. The reason for having such

a feature is the necessity of capturing the relevant dimension of a controversial context as well as to integrate a broader set of design principles (i.e., refers to six design dimensions). In particular, besides introducing feasible steps for analyzing and synthesizing insights (i.e., exploring the context from stakeholder's perspectives), the methodology has to provide an actionable framework to facilitate the translation moments, multilateral negotiations, and a discursive dialogue between contradictory voices [57]. Furthermore, measuring the interconnectivity of actors as well as the strength of the new network is highly essential for future studies. Learning from network theories, there are certain correlations between the strength of a network and the efficiency of problematization. Such a correlation can address some of the remaining questions, for example, to what extent the identity of the actor(s) has been changed through the translation processes and to what extent the ideal of paradigm shift is about to emerge in the near future. From a theoretical perspective, some of these concerns (about the strength of the network) can be addressed by creating an aspirational 'narration' or a strong 'core story' between actors [145]. However, a further suggestion (after developing the design methodology) is to conduct an empirical study in a real controversy context.

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