Both educational and research-oriented workshops were set up to have at least four teams working on the same Miro board. This was done to enable participant teams to see how others are responding to the challenges set by the templates and to spark new thinking. Because the individual canvases upon which the templates are positioned can be exported as PDF files, documenting the results of an online workshop session was easy to do.

Supporting Social Interactions for Online Workshops

Online workshops create many new opportunities including the ability to work with people across diverse geographies and time zones, and new technologies like Miro and Zoom make team collaboration and hi-fidelity work much easier. In our experience, the biggest drawback has been the loss of person-to-person interactions and the many "sidebar" conversations that happen in analog workshops. More specifically, the simple, informal interactions that take place over a cup of coffee or shared lunches or dinners that often accompany workshops are lost, and the network opportunities with like-minded colleagues are less likely to happen.

To mitigate some loss of social interactions, Transition Design workshops have adopted the practice of creating a Coffee Table Board that participants are invited to join about one week prior to the first session. This informal, digital gathering and posting space invites participants to create a visual profile and share something personal about themselves as well as post links to resources and information relevant to the workshop. Everyone is encouraged to continue populating the space over the duration of the workshop; instructors post links to recorded sessions and reading materials, and participants often draw connections among themselves as they discover common interests. Additionally, the Coffee Table Board also provides a space in which participants can practice their Miro skills prior to the workshop and in most workshops, participants continue adding to it over time.

Educational vs. Research Workshops

Both educational and research online workshops use the same set of templates described in the previous section of this paper but have different objectives and outcomes as outlined in *figure 13*.

The primary objective of educational workshops is to acquaint participants with the anatomy and dynamics at work within complex systems and systems problems. In contrast, research-oriented workshops are primarily a way in which to gather stakeholder perspectives, knowledge, and concerns relative to the wicked problem in question.

Moreover, communicating the complexity and multi-perspectival nature of the problem is an objective for both types of workshops and research workshops. Research workshops are positioned with stakeholder participants as an opportunity for them to also learn how to frame wicked problems within more appropriate contexts and to formulate systemic solutions.

OBJECTIVES FOR EDUCATIONAL & RESEARCH WORKSHOPS IN TRANSITION DESIGN

WORKSHOP GOALS & OBJECTIVES	EDUCATIONAL WORKSHOPS	RESEARCH WORKSHOPS
COMPOSITION OF WORKSHOP COHORT	**Educational workshops are comprised of diverse participants, sometimes from diverse organizations and countries who want to learn about Transition Design. Participants work in teams and are assigned on the basis of their interest in a particular problem or by geographic location.**	**Research workshops are comprised of the stakeholder groups connected to or affected by the wicked problem in question. Stakeholder participants work together as a team in the same workspace.**
FOR THE WORKSHOP AS A WHOLE	**The high-level learning objectives** for educational workshops in Transition Design are: **1)** to introduce participants to the anatomy and dynamics of systems problems and their systems contexts (systems thinking); **2)** to emphasize the need to frame complex problems in radically large spatio-temporal contexts; **3)** to introduce participants to the emerging applied Transition Design approach.	**The high-level research objectives** for research workshops in Transition Design are: **1)** to gather perspectives, knowledge and suggestions from stakeholders connected to the wicked problem; **2)** to provide stakeholder participants with a deep understanding of the problem's complexity; **3)** to aid stakeholders in achieving a shared understanding of the problem.
STEP 1: MAPPING THE WICKED PROBLEM	**The learning objectives: 1)** introduction to the systemic relations between the 5 archetypal societal sectors in which issues related to the problem manifest; **2)** acquaint participants with the multiple interconnected and interdependent issues that comprise a wicked problem; **3)** acquaint participants the material and non-material nature of issues that comprise a wicked problem; **4)** acquaint participants with the social roots of wicked problems (collective beliefs, cultural norms, assumptions, behaviors and practices); **5)** introduce participants to the concept of a 'wicked problem cluster'; multiple, interrelated and interdependent wicked problems with common issues.	**The research objectives: 1)** to gather each stakeholder group's perspectives, opinions and knowledge about the wicked problem being mapped; **2)** create the conditions for collaborative interactions, knowledge exchange and understanding between stakeholder groups; **3)** facilitate stakeholders' understanding of and appreciation for the complexity and multi-perspectival nature of the wicked problem in question; **4)** acquaint participants with the social roots of wicked problems (collective beliefs, cultural norms, assumptions, behaviors and practices); **5)** introduce participants to the concept of a 'wicked problem cluster'; multiple, interrelated and interdependent wicked problems with issues that relate to and exacerbate the wicked problem they are connected to.
STEP 2: MAPPING STAKEHOLDER RELATIONS	**The learning objectives: 1)** introduction to the social dynamics that permeate wicked problems and that are barriers to problem resolution; **2)** acquaint participants with practice of mapping stakeholder fears and concerns and desires as a strategy for understanding these social dynamics; **3)** acquaint participants with the practice of "affinity mapping"; looking for areas of opposition and conflict (between stakeholder groups) as well as areas of agreement, where consensus-based work may begin; **4)** acquaint participants with the uneven nature of power relations among stakeholder groups and the understanding that some groups may be invested in not seeing the problem resolved; **5)** understanding the importance of stakeholder "voice" and the way it can inform solutions in the present and future.	**The research objectives: 1)** to give voice to stakeholder groups' complex feelings about the wicked problem; **2)** further acquaint stakeholders with the opposing perspectives and conflicting agendas among the different groups to produce an understanding of the complexity of the problem and the fact that it cannot be resolved by a single, quick solution; **3)** encourage stakeholder groups to be representatives (within their larger stakeholder networks) of the multiple fears, concerns and perspectives that comprise the problem; **4)** reveal areas of affinity and agreement among groups (who often believe there is no common ground).

Figure 13 (*continue on page 252*). Matrix Comparing Objectives and Outcomes Between Educational *vs.* Research Workshops in Transition Design.

	Research objectives	Learning objectives
STEP 3: MAPPING THE HISTORIC EVOLUTION OF A WICKED PROBLEM	**The research objectives: 1)** to leverage the historical knowledge related to the wicked problem and the multiple issues, events and factors that contributed to its rise to produce a multi-perspectival overview of its evolution; **2)** to identify multiple historical "threads" that comprise the narrative and that can inform stakeholder future visioning and solutioning; **3)** identify key historical factors that either contributed to or mitigated the problem as strategies to inform solutions in the present (primarily for the researchers analyzing the results).	**The learning objectives: 1)** illustrate how a deeper understanding of the historic evolution of the problem can produce a better understanding of the problem and informs solutions in the present; **2)** introduce participants to the concept of socio-technical systems transitions and the Multi-Level Perspective Framework as a context for understanding them; **3)** acquaint participants with the way in which countless wicked problems arise within the temporal context of socio-technical systems transitions; **4)** introduce participants to the practice of examining how people were living, working and meeting their needs "in place" in pre-industrialized societies as a strategy to inform future visions.
STEP 4: CO-CREATING FUTURE VISIONS	**The research objectives: 1)** to give voice to stakeholder hopes and dreams about the future in order to reveal common ground during the session this builds bridges and diffuses tension; **2)** via analysis reveal the common ground among stakeholder groups (as well as identify oppositions) that can inform solutions in the present; **3)** analyze stakeholder visions which often contain the "seeds" of solutions in the present; **4)** synthesize the stakeholder visions to formulate future-based narratives that can be presented and vetted by the same stakeholder groups in subsequent sessions; **5)** document the visions for use in the formulation of systems solutions.	**The learning objectives: 1)** illustrate how the co-creation of long-term future visions, when undertaken by stakeholders has the potential to transcend their differences in the present and help them find common ground; **2)** introduce participants to the Domains of Everyday Life Framework; the systems levels at which everyday life emerges as a strategy for re-imagining lifestyles that are more sustainable, equitable and place-based, yet cosmopolitan in their global awareness and exchange of information and technology; **3)** familiarizing participants with the importance of constructing future narratives that both motivate and guide long-term systems transitions; **4)** to deeply interrogate how present-day, dominant and unsustainable paradigms can be re-conceived.
STEP 5: DESIGNING FOR THE DECADES-LONG TRANSITION	**The research objectives: 1)** to leverage stakeholder knowledge, perspectives and ideas about what is relevant or irrelevant to their long-term transition toward the desired future; **2)** via analysis, reveal where there is affinity and consensus for concepts and solutions as well as opposition; **3)** challenge the stakeholders to prepare mentally for the long process of resolution and acquaint them with the long process of transition-ing; **4)** formulation of milestone narratives via analysis and synthesis which can be presented back and vetted by the same stakeholder groups in subsequent sessions; **5)** document the milestone visions for use in the formulation of systems solutions.	**The learning objectives: 1)** to introduce participants to the concept of thinking about and planning for collective transitions toward the long-term desired future that may take multiple years or decades; **2)** introduce a framework for thinking rigorously about the decades-long transition as if it were a journey to pack for; to assess what to keep, what to leave behind and what new ideas would aid them on the journey; **3)** introduce participants to the concept that aspects of their future vision are already here in the present and can be the basis for ecologies of systems interventions that act as "steps" on the transition pathway; **4)** to introduce participants to the practice of thinking about the transition itself via the formulation of "mini visions" or milestones that are not predictions but rather an attempt to think about the probabilities and possibilities associated with intentional systems transitions.
STEP 6: DESIGNING SYSTEMS INTERVENTIONS	**The research objectives: 1)** to leverage the knowledge and experience already within the system (stakeholder perspectives) to gather ideas for systems interventions; **2)** via analysis, reveal where there is affinity and consensus for interventions that can be implemented in the present and near-term; **3)** use the stakeholder input as the basis for proposing "ecologies of systems interventions" that amplify/scaffold each other; **4)** via analysis develop a palette of interventions that can be vetted with stakeholders and/or prototyped for testing.	**The learning objectives: 1)** to introduce participants to the concept of developing "ecologies of systems interventions" as opposed to one-off solutions, when addressing wicked problems; **2)** demonstrate how information and insights from the previous 5 steps can be used to inform ecologies of systems interventions; **3)** show participants ways in which the future vision and milestones can be connected to ecologies of interventions so that they act as "steps" along the transition pathway toward the desired, long-term future; **4)** familiarity with the "intervention matrix" that challenges participants to develop an ecology of systems interventions that are situated within different societal sectors (from the problem map) and different levels of the Domains of Everyday Life (spatial scale); **5)** challenge participants to understand how systemic interventions that address wicked problems sometimes "appear" to be unrelated but actually amplify and scaffold each other via their connections to the future vision, milestones and "stuck" places identified in the problem and stakeholder maps.

The Challenge of Representing and Working with Stakeholder Groups

The Transition Design approach argues that the concerns and perspectives of as many different stakeholder groups as possible must be considered when framing and addressing complex problems. Additionally, these stakeholder groups should include both the human and the non-human. The relations among these stakeholder groups is part of what makes problems wicked and resistant to resolution, and these relations are made complex due to conflicting agendas and uneven power relations. In this context, any wicked problem will have stakeholder groups that have a vested interest in the problem not being addressed. Thus, these groups are likely to have conflictual relations with those who are adversely affected by the problem. These are important distinctions because there are often stakeholder groups connected to a problem who may be indifferent to seeing it resolved, or in some cases, may be actively resistant to its resolution.

First, in educational workshops, participants must conduct internet research to try and learn as much about the problem and the groups connected to/affected by it as possible. In these workshops, we emphasize that participants are speculating about the concerns of the different groups and challenge them to adopt postures of advocacy in articulating these concerns. The results of educational workshops can, at best, serve as a sketch for undertaking research with actual stakeholders. The objective is to make participants aware of the concepts of conflicting stakeholder agendas and concerns and the need to find common ground and affinity between groups as part of the problem defining process.

Meanwhile, research workshops are conducted with actual stakeholder groups and therefore present different challenges that require more preparatory work and, in most cases, facilitators who can manage the sometimes-difficult feelings that arise. Every wicked problem manifests in place and culture-specific ways, so there are no templates or hard and fast rules that are universal for all groups in all places. Further, the Transition Design approach is still in the early stages of evolution and application. Some of the initial observations, insights, and strategies that have emerged from workshops in which multiple stakeholder groups are brought together include the following:

• Moments of profound understanding: participants often experience "aha moments" in which they arrive at an understanding of and appreciation for the complexity of the wicked problem they are working with. A key insight that often comes with this realization is that no single solution will resolve the problem. This often opens them up to the Transition Design approach, which argues that wicked problem resolution will require "solutioning" over many years or even decades.

• An appreciation for multiple perspectives: because the workshops ask each stakeholder group to give voice to their emotions about the problem and how they are connected to or affected by it (fears/concerns and hopes/desires), each group has the opportunity to speak directly and honestly about their feelings. They are asked to record these feelings in the first person singular or plural. We have been told repeatedly by participants that these statements, when viewed as a whole on the Miro board, are quite poignant and compelling, even for groups that may hold the opposite point of view. Workshops ideally build in time for participants to peruse each other's workspace in order to familiarize themselves with

the perspectives and emotions of the other groups. When the time in the workshops is limited, ongoing access to the boards is provided so that participants can read each other's statements outside the sessions. This step in the approach often serves to diffuse feelings of hostility or standoffishness and has opened lines of empathy and communication among groups and has given groups a better understanding of why they act as they do, relative to the problem. This type of bridge building is crucial for the work that comes later.

- Uneven power relations and degree of adversity: when designing stakeholder workshops, we have learned that it is important to understand the power relations and each group's relationship to the problem ahead of time. The advantages of bringing groups together are outlined above. However, there are also challenges and cautions that must be considered. When groups who are adversely affected by the wicked problems are brought into a workshop with groups who are not (either because they are creating or exacerbating the problem and/or have a stake in not seeing it resolved), then precautions must be taken to ensure that the disadvantaged groups are safeguarded. Here, acknowledging at the onset of the workshop those groups who are adversely affected by the wicked problem is a strategy to be considered. Additionally, appointing experienced facilitators with similar backgrounds/ethnicities/ genders etc. to work with the complex feelings that arise during the workshop has proven helpful. It is also important to ensure that there is adequate time following the exercises for group discussions (with facilitators present) in which the disadvantaged groups are able to voice concern/feelings that arise in a safe, mediated space in which they feel "heard." Further, orienting/preparing all workshop participants for this type of interaction is critical so that they are not taken unaware and have been given the proper context and have had objectives clarified prior to their agreement to participate.

Conclusion: Reflection on the Workshops

Workshops have been delivered to students and faculty at the university level (disciplines include design, architecture, anthropology, business, fashion design, and history), non-profit organizations, and a range of companies in several countries. Participant feedback indicates that educational workshops to teach the anatomy and dynamics of systems and systems problems as well as systems thinking in general have been successful. This success is illustrated by the extremely favorable responses of the workshop participants to questionnaires in which they were asked to rate various aspects of the workshops on a scale of 1 (poor) to 5 (excellent). For example, to the question "How would you rate your overall experience of the workshops," 94% of the 172 participants who responded did so with either a 4 or 5.

Moreover, research workshops are more complex and in an earlier stage of development than the educational workshops, and represent a rich territory for research and development. Transition Design can still be considered an emergent area of research, and working with stakeholders to gather their knowledge, perspectives, and concerns in research workshops (in order to bridge divides and reveal areas of common ground) must be further explored and developed. Experts from a variety of fields and disciplines should be in-

volved as part of developing protocols for stakeholder engagement and in developing and running workshops, especially when opposing stakeholder groups are brought together. Research workshops in Transition Design have proven to be a very useful way of bringing stakeholders together and to quickly gather perspectives, knowledge, and concerns as well as ideas about how to address the problem in question. Here, a systemic overview of the problem and possible solutions to it that originates with stakeholders is created as a result of the workshops. However, the workshops have clear limitations, including: **1)** the limited number of participants that can be included; **2)** the inability of some stakeholders to participate in an online format (for a variety of reasons including lack of access); **3)** in many cases, stakeholder groups who simply do not care about the problem or who may be contributing to the problem may be reluctant to participate; **4)** Transition Design workshops require a significant commitment in terms of time/availability and this greatly limits the ability of a workshop format to reach crucial stakeholder groups.

In this context, developing a new type of online questionnaire and other "groupthink" exercises is needed. When stakeholders are thinking together and encountering other responses and perspectives, it triggers "systems thinking" and produces a much richer sampling from a stakeholder group. Here, platforms that enable individual stakeholders to respond at their leisure, over a period of time, while watching a growing body of responses, is an area for further exploration and research.

Additionally, aspects of the workshops and their follow-up need to be developed:

1. A significant amount of data is generated in the workshops. This material can potentially inform a wide variety of "systems interventions" (solutions), but these need to be developed with the stakeholders themselves. Therefore, methods need to be developed for processing this material and for ongoing stakeholder participation in the co-development of systems interventions. A potential next step in the evolution of Transition Design workshops would be the design of follow-up engagements with stakeholders to develop solution concepts and prototypes that originate in the workshops.

2. The workshops sometimes surface conflict and trauma related to the problem in question. A focused effort is therefore needed to develop a facilitation protocol for key stakeholder groups in workshops as well as a way to create space for different groups to "voice" concerns as necessary. The workshops require a significant time commitment from participants, so the ratio of active engagement (data gathering) with the templates vs. time for mediated or facilitated discussion must be carefully considered. Further, such discussions should be iterated over several engagements with stakeholder groups who are willing to participate.

3. In order to be a reciprocal offer that is of mutual benefit for stakeholders, workshop leaders, and facilitators alike, Transition Design workshops need to provide tangible/valuable outcomes for all stakeholder participants and their networks. For many, the offer of a systems education and an introduction to Transition Design is reason enough to participate, but for some (particularly the most beleaguered stakeholders), it is not. Thus, more exploration is necessary to find more immediate, tangible/valuable outcomes for all stakeholder participants, and not just those who want to learn about Transition Design or systemic thinking. This will help ensure participation from the right mix of stakeholder groups.

This paper has reported on the format, content, and outcomes of both educational and research workshops in Transition Design. It has also speculated about where further research and design can contribute to the efficacy and reach of these workshops. It is hoped that a wide range of researchers from diverse fields and disciplines as well as geographies and cultures will join in this exploration in the coming years.

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Resumen: El Diseño para la Transición es una nueva área de estudio, investigación y práctica destinada a abordar problemas complejos y perversos como una estrategia para dirigir intencionalmente las transiciones de los sistemas hacia futuros a largo plazo que sean más sostenibles, equitativos y deseables. Este documento discutirá el enfoque del Diseño para la Transición aplicado al abordaje de problemas complejos y perversos, y explicará cómo también puede servir como una estrategia para cambiar las trayectorias de transición de nuestras comunidades, organizaciones y sociedades enteras.

También informaremos sobre una serie de talleres impartidos entre julio de 2020 y agosto de 2021 a varios cientos de participantes en cinco países de los sectores industrial y sin fines de lucro. Los talleres se llevaron a cabo completamente en línea utilizando una combinación de tecnologías Miro y Zoom y tenían dos objetivos: 1) presentar a los participantes el enfoque de Diseño para la Transición aplicado al abordaje de problemas complicados y comprender la anatomía, la dinámica y el comportamiento de sistemas complejos y problemas de sistemas; 2) realizar una investigación cualitativa de las partes interesadas que recopile una variedad de perspectivas sobre el problema perverso, así como las posibles soluciones de los sistemas.

Palabras clave: Diseño para la transición - Impartición de talleres - Teoría del Diseño - Diseño sostenible - Diseño ecológico - Problemas perversos - Cambio de sistemas - Pensamiento sistémico - Principios de sistemas - Transiciones hacia la sostenibilidad

Resumo: Design for Transition é uma nova área de estudo, pesquisa e prática destinada a abordar problemas complexos e perversos como uma estratégia para direcionar intencionalmente as transições de sistemas para futuros de longo prazo mais sustentáveis, equitativos e desejáveis. Este artigo discutirá a abordagem do Design for Transition aplicada ao enfrentamento de problemas complexos e perversos e explicará como ela também pode servir como uma estratégia para mudar as trajetórias de transição de nossas comunidades, organizações e sociedades inteiras.

Também relataremos uma série de workshops realizados entre julho de 2020 e agosto de 2021 para várias centenas de participantes em cinco países dos setores sem fins lucrativos e industriais. Os workshops foram conduzidos inteiramente online usando uma combinação das tecnologias Miro e Zoom e tiveram dois objetivos: 1) apresentar aos participantes a abordagem Design for Transition aplicada ao enfrentamento de problemas complicados e entender a anatomia, dinâmica e comportamento de sistemas e sistemas complexos problemas; 2) conduzir pesquisas qualitativas de partes interessadas que reúnam uma variedade de perspectivas sobre o problema perverso, bem como possíveis soluções de sistemas.

Palavras-chave: Design para transição - Workshop - Teoria do design - Design sustentável - Design ecológico - Problemas perversos - Mudança de sistemas - Pensamento sistêmico - Princípios sistêmicos - Transições para a sustentabilidade