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The Other Side of Design: Tension manifolds and collective action

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The Other Side of Design: Tension Manifolds and Collective Action

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Systemic issues feature dynamic complexity that challenges cognitive, contextual, spatial, and temporal perceptions within 'social messes' (Ackoff, 1974) and 'super-wicked problem' (Levin et al., 2012) environments. Systemic designers thus find themselves working with tensions endemic to paradoxes, breaks in scale, value (or goal) conflicts and heterogeneous contexts. These differences may yield opportunities for design exploration when considered as spaces of praxis. Tensions within such spaces often make collaboration and collective action challenging – yet can also be considered as a type of design medium. This paper proposes the concept of 'tension manifolds' – and explores the potential for enabling design within systemic issues, with the goal of reframing tensions as a type of design affordance that enables collaboration and collective action in multi-stakeholder environments.

Keywords: systemic design, design tensions, collaboration, collective action, field theory, tension manifolds

Introduction

To enable collective action through transdisciplinary collaboration in multi-stakeholder environments, we explore the 'other side of design' – focusing on the conglomerate of dynamic tensions between the stakeholders, organizations and entities engaged in the context of a complex social challenge (Matic, 2017) – as a conceptual ontology at the intersection of 'problematiques' (Christakis, 2006), 'social messes' (Ackoff, 1974), 'wicked problems' (Rittel & Webber, 1973), 'post-modern complexity' (Cilliers, 2008), and the 'super-wicked problem' (Levin et al., 2012) environments.

We term such conglomerates as 'tension manifolds' – multi-dimensional structures postulated to be dynamic yet semi-stable, ontogenized by the needs of diverse socio-cultural actors that continually strive to maintain relative equilibrium through the processes of change; while simultaneously attempting to maximize self-reflexive constructs such as autonomy, mastery and purpose (Pink, 2009).

The homeostasis within 'tension manifold' structures is postulated to be established through the tensegrity principles (Marsico & Tateo, 2017) between the socio-affective forces (Massumi, 2002) that dynamically emerge between the involved actors; who engage in reflexive discoursive practices (Zienkowski, 2017), and create a type of cybernetic circularity (Krippendorff, 1994) which 'holds' the emergent tensions in-place.

In this sense, the homeostatic tensions – that are in a dynamic yet temporary equilibrium – become an opportunity for considering the 'other side of design'; where, instead of designing only for the spaces that the actors inhabit, we re-position design towards the tension spaces between the actors themselves, and the tensegrity relationships that hold them in-place.

Systemic issues imply perceptive shifts that can be experienced as uncertainties around value transience (permeability or stability of existing relationships), temporal effects (perception of time-scales), and phase-changes (likelihood of paradigmatic alterations) from the perspectives of the involved actors. Systemic issues can also be considered as existing within liminal spaces (Van Gennep, 1909) that necessitate employing stakeholder strategies capable of enacting liminal transitions (Turner,1966) – while enabling salutogenesis (Antonovsky, 1996).
Yet effectively designing liminal transitions within systemic issues can also be challenging without considering the structure of tensions and dynamic forces between the involved stakeholders, actors, and participants. This

paper proposes the concept of 'tension manifolds' as an invitation towards a reflexive practice in design and posits questions for further research and exploration.

1. Engaging complex issues

When diverse stakeholders engage a complex issue, they often perceive different aspects of the challenge and its presupposed enclosing environment. This is in part because what's identified as a 'single' issue is likely related to several interacting systems – each of which can be considered separately, in a way that may be of differing interest to the affected parties.

Participants tends to perceive the 'parts' of a complex issue they are most exposed to – which both frames the boundaries of their understanding and limits it, due to the specific properties that each way of 'looking' embodies. The varied perspectives tend to lead to differences in understanding – that might be identified as 'polarities' to be managed (Johnson, 1992), or benefit from dialectical thinking approaches (Basseches, 2005).

At the same time, stakeholders often attempt to definitely understand the evolving systemic issues to enable adaptive responses. In this process, participants must negotiate the *cognitive*, *contextual*, and *cooperative ambiguities* (Matic, 2017) – in the absence of being able to perceive the totality of a given challenge. Since the it is not possible to perceive the entirety of a given systemic issue – as per cognitive and contextual limitations imbued in the dynamics of 'wicked problems' (Weber & Rittel, 1973), 'super-wicked problems' (Levin et al., 2012), 'social messes' (Ackoff, 1974) and the 'post-modern complexity' (Cilliers, 2008) – an attempt to formulate a well-informed strategy creates dynamic tensions.

This introduces stresses that affect perceptions of relationships and influences the stakeholder understanding of their own situation – which informs the subsequent orientations towards the possibilities of collective action.

2. Design as focused on 'external' perceptions

The process of engaging systemic issues is further challenged by the stakeholder ability to focus on different ecosystemic scales – such as, micro, mezzo or macro (Liljenström & Svedin, 2005) – where, there is no guarantee that participants are exploring the identical aspects of a given challenge or opportunity space.

Within the over-arching systemic issue, the stakeholders can 'look' at different complex sub-systems and experience very specific 'homeostatic pressures' in their desire to maintain some semblance of equilibrium and stability. The stakeholders are not likely to be able to definitely compute an ideal future or a deterministic adaptive strategy, since the systemic issue changes are dynamic – while the act of expanding understanding iteratively alters the possibilities of action.

At the same time, stakeholders are likely to experience a necessity to act in order to start adapting – while working to address some aspects of a broader systemic issue.

To this effect, stakeholders comprise the best understanding of the systemic issue possible to actuate effective action, which creates a type of homogenized sense-making surface that represents a current, unified understanding of a given systemic issue. This generalizes perceptions in Deleuze's rhyzomatic sense (Holland, 2013; Semetsky, 2003) through the principles of 'difference and repetition' (Williams, 2013) that lends a sense of universality – while simultaneously lacking in specificity that might apply to each stakeholder's individual experience.

This drives the design towards the 'external' aspects of a systemic issue – where, the identification of key affordances has been compressed into a certain kind of a representative homogenized design surface, as a non-dynamic 'snapshot' that begins to inform the subsequent design approaches.

3. The 'inside' of design – towards the 'tension manifolds'

While the engaged stakeholders are focused on the 'external' aspects of a given systemic issue – describing the challenge as it appears within the context of best current understanding – a significant portion of the design challenge is also situated on the 'inside' of the stakeholder experience and the design process itself.

From this perspective, the 'inside' of the design challenge is comprised of the evolving tensions that the stakeholders experience in relation to the systemic issue, as they dynamically attempt to maintain their sense of equilibrium and homeostasis amid the changing circumstances (of their 'snapshot', or design surface).

How might this dynamic space on the 'inside' of design be understood, to possibly assist in the process of engaging systemic issues?

Field Theories

The stakeholders within a systemic issue can be said to be participating in shared experiences that can be understood through the lens of field theory (Lewin, 1942; Martin, 2003) – where social experiences can be analyzed with topological concepts.

Space, as a core construct in topology is of interest to mathematicians – who "understand sets and spaces in terms of their constituents, or more precisely, in terms of the relations among the aggregates of elements that form subspaces" (Carter, 1995).

The ability to describe effects between diverse objects and relationships in the context of a shared field influenced a range of disciplines, including gestalt psychology – which aspires to "help individuals and groups to change their perception of themselves and the situation in question, which, in turn, they believe will lead to changes in behaviour" (Burnes & Cooke, 2013).

Subsequently, field theories have been evolved by Pierre Bourdieu (1975) and others, in diverse areas. These include critical discourse studies and collective learning, arguing that novel approaches are required to enable "continuous reflection on the adequacy of existing conceptualisations of the social" (Forchtner & Schneickert, 2016); in the study of interdisciplinarity, arguing for a view of science as a "set of forces that shape struggles among scientists and struggles that reproduce or transform those forces" (Panofsky, 2011); in communication studies, focusing on "how to understand the media both as an internal production process and as a general frame for categorizing the social world" (Couldry, 2003); and in political science, to explain concepts such as modern hegemony in international relations (Nexon & Neumann, 2018).

The field theory approach also led to a change model attributed to Lewin (Cummings et al., 2016) that has subsequently become both controversial and influential – consisting of the 'unfreeze', 'change' and 'freeze' stages.

Whether Lewin directly authored it or not, the model has garnered widespread use. Yet, when immersed in systemic issues, stakeholders may not always be able to apply this approach – as complex environments dynamically change. An attempt to 'freeze' the situation sufficiently to create a temporarily stable environment almost immediately starts departing from the evolving change dynamics (and therefore our systemic 'snapshot') – which forces stakeholders to concede to the superior change forces, increasing chances of abandoning the initiative.

Tensegrity as a Field Aspect

At the same time, stakeholders in systemic issue environments often appear to be 'locked' into sets of tensions – which emerge as the result of the 'push and pull' relationships that immerse participants to varying extents.

Although dynamic in nature, such tension structures exhibit homeostatic properties that retain their overall integrity under pressure. This can be aptly related to the phenomena of tensegrity – where certain structural elements are 'pre-loaded' with stress, while others are 'compressed' in a way that influences perception (Cabe, 2018).

Diverse stakeholders attempting to engage in collaborative strategies become subject to a social field situation. The actors engaged within a systemic issue are exposed to sets of tensions that are 'pre-loaded' with stress, while contending with 'compression' forces elsewhere – in such a way where the 'degrees of freedom' available for individual or collective action (Poteete et al., 2010) are effectively limited.

Tension Manifolds

In a field theory sense, tensegrity structures can be said to 'curve' the spatial medium around them.

Because the tensegrity structures that inform the spatial curvatures are homeostatic and exhibit properties that are resilient to change, we may choose to term such curvatures as "tension manifolds" – that represent sets of tensions that stakeholders experience within an evolving systemic issue. Yet these sets of tensions tend towards homeostasis – as part of an attempt by the stakeholders to maintain an overall state of dynamic equilibrium within a systemic issue.

While the evolving experiences of the systemic issue dynamically create new sensemaking pressures (Weick, 1995), the 'inside' of the tension manifold alters at a reduced rate – as the stakeholders evaluate perceived external changes in relation to attempting to maintain equilibrium. This difference in rates of change can be thought of as a 'change differential' that can be utilized in design processes within systemic issue contexts.

While it may be compelling to think about the challenge-space as something that is primarily 'out there', the stakeholders tend to focus on achieving their own homeostasis in response to the pressures of an external challenge. Thus, the stakeholder actions have two components – the *adaptive response* to an external adaptive pressure, and the *homeostatic response*, as an attempt to maintain own sense of structural integrity; as per Figure 1:

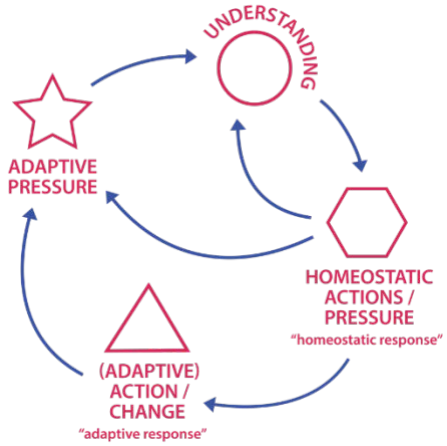

Figure 1: Adaptive and homeostatic responses

This effectively introduces two different design challenges - that are related yet not identical.

A common assumption might be that in working towards addressing systemic issues, we attempt to align collective action strategies towards an 'objectively' perceived, 'outside' challenge. At the same time, the engaged stakeholders temper their adaptive responses with the homeostatic response –focused on addressing the subjectively perceived, 'inside' challenges.

This presents an opportunity to leverage the 'other side' of design – and focus on the 'inside' comprised of the varied tensions experienced by the diverse stakeholders. This approach entails approaching manifold topologies as an active design medium in enabling diverse stakeholders in systemic issue contexts.

4. Tension manifolds' as a design medium

Manifolds are a set of topological objects that describe a range of possible geometries.

Complex manifolds (Carter, 1995) extend the notions around Euclidian spaces, moving away from Newtonian mechanics to enable descriptions of spatial curvatures – that were instrumental in enabling theoretical concepts such as Einstein's space-time construct.

Certain classes of manifolds have features that may not exist in Euclidian spaces – such as the concept of 'self-intersection'. To describe their shape, complex manifolds utilize concepts of 'maps' and 'atlases' that can outline various regions of their topological spaces. This aligns well with systemic design methods – and enables mapping conversational constructs and cybernetic concepts that include notions of recursion and reflexivity.

Reflexivity and Geometry

In social sciences, reflexivity "is considered in terms of acts of interpretive movement" (Zienkowski, 2017) where, "social actors, organizations and systems throw reflexive loops around themselves, around others, as well as around spatial, temporal, linguistic, cognitive, social and historical dimensions of contextual reality".

The relationship between reflexivity and interpretation – and especially in cyclical processes involving the observer and the relationship with contextual reality – has been explored extensively in cybernetics (Krippendorff, 1994) as relating to design; delineating a "substantial relation between cybernetics and design in terms of the circular, conversational structure that they both share" (Sweeting, 2015). Yet reflexive or self-intersecting phenomena can be challenging to 'map' in purely Euclidian geometries. For instance, parallel lines never intersect in Euclidian spaces – whereas, in curved spaces lines that are parallel in one region might eventually intersect in another region of space.

Tension Manifolds

As an extension, 'tension manifolds' are postulated as multi-dimensional objects that exist in complex geometries. In this sense, they can be considered as more versatile in terms of spatially relating diverse, yet interconnected phenomena experienced by stakeholders. In this sense, 'tension manifolds' might be more akin to the proverbial story about the elephant – where, different people might be attempting to infer the shape of the large animal by touch, while arriving at quite different accounts that describe alternate yet very much valid first-hand experiences.

Manifolds can be helpful as an analogue for 'mapping' different stakeholder experiences within a particular systemic issue – since they allow for the 'view' of each region of 'space', as inferred by each stakeholder, to be dramatically different, yet entirely valid; dependably on the position within the space they are exploring (on the topological surface), the direction of their 'looking', and the characteristics of their perceptive cone (describing 'how' they are looking).

In addition to being able to integrate seemingly disparate views into a single cohesive structure, manifolds may also be useful as representative surfaces in that they can support the concept of continuity of experience within complexity. This translates well to the identity psychosocial structures (Marcia et al., 2012) that tend to be continuous, and stakeholder sensemaking processes that lean towards the cohesive. As such, manifolds have an imbued potential for describing emergent phase-changes in psychosocial landscapes – that may be considered as 'liminal transitions' (Turner, 1995).

While the 'external' stakeholder adaptive strategies may change, the 'tension manifolds' describe dynamic conglomerates of compression and expansion forces associated with the stakeholder core adaptive / motivating goals – that have a greater degree of resilience to change then the 'outside' adaptations. From the stakeholder perspective, the 'outside' adaptations are a means of achieving the 'inside' adaptive goals, in a specific context – defined by the perceived boundaries of a systemic issue.

'Tension manifolds' may be utilized to describe tensions as a certain type of psychosocial 'fascia' – a 'connective tissue' between the stakeholders, their experiences of a systemic issue, and the associated adaptive responses. In this sense, the shape of a 'tension manifold' corresponds to the experienced adaptive pressures within a systemic context, and any changes that stakeholders make within their own adaptive responses and constitutive relationships. From this perspective, 'tension manifolds' emerge out of the reflective, recursive process of stakeholders interpreting their experiences around the perceived potentiality for change in their constitutive relationships.

The ‘tensegrity’ aspect of tension manifolds can be considered as the container of the dynamic forces as experienced by the stakeholders. Within formal structures – such as a church, a bridge, or a skeletal system – the more complex a tensegrity structure, the more degrees of freedom it is likely to have. The size of movement within a tensegrity structure might depend on the stimuli-induced dislocation, the degrees of freedom between the constitutive elements, and the active forces within the tensegrity structure itself.

The ‘specificity’ aspect of tension manifolds can be considered as the container of the cyber-semiotic (Brier, 2010) ‘curvature’ – which describes differentials in experience between different stakeholders. The more specific and differentiated stakeholder experiences are, the more ‘curvature’ there is in a tension manifold – since, differing cyber-semiotic perspectives generate alternate ways of ‘looking’ at and perceiving the world. This is at odds with common tendencies to make systemic issues ‘universal’ in their character, and explanatory in reductionist terms.

5. Leveraging tensions as design affordances

Systemic Issue Challenges

To effectively adapt to systemic issues, stakeholders and participants often need to transform in some way – which can be considered as a transition in liminal spaces (Turner, 1995), and component of ‘liminal journeys’.

However, this transformation is hindered by the challenges in context understanding, and in perceiving a 'stable’ future that the stakeholders and participants are transforming towards – which effectively prevents the enactment of ‘liminal rites’ and restricts the degree to which salutogenesis (Antonovsky, 1996) can be designed for.

Tensions as Strategies

Design methods can take the inherent affordances of ‘tension manifolds’ into account when engaging systemic issues – to simplify the ‘liminal journeys’ for the stakeholders involved by leveraging three distinct strategies.

Strategy #1 – Alter the ways of looking. The first strategy is to identify places where the position, direction, or characteristics of ‘looking’ may be altered for the participating stakeholders, to allow for a different emergent character of their ‘perceptive cones’. Because of the involved cybernetic circularities, any alterations in the perceptive act of ‘looking’ changes the orientations of the stakeholders – thus creating additional possibilities for collaboration and collective action that may be imbued into the systemic issue context.

Strategy #2 – Identify tension structures. The second strategy is to identify the areas of extreme ‘curvature’ within the tension manifolds – as areas of topology with the greatest contrast between the assumed ‘universality’ of the design medium and the actual ‘specificity’ as experienced by the stakeholders involved. Such identified areas can be targeted for further exploration via systemic design processes – to help reduce any ‘change differentials’ between the exigencies of the adaptive responses, against the stakeholder tendencies of gravitating towards homeostatic responses.

Strategy #3 – Define inflection points. The third strategy is to identify inflection point opportunities within the associated tensegrity structures – as places where the ‘pre-loaded’ tensions and the 'compression’ relationships may be altered to allow greater degrees of freedom for the participants involved. Due to the dynamic nature of tensegrity structures, systemic designers must take care to proceed cautiously – as alterations in constitutive relationships through a design instrument might compromise the cohesion of the stakeholders involved.

6. Use case

RSD3: “Saving Lives by Design”

A useful example of designing with tensegrity structures – that can be analyzed through the lens of “tension manifolds”, as an expression of differential perceptions between diverse stakeholders – is Bhaskar Bhatt’s project presented at the Relating Systems and Design (RSD3) conference in Oslo, Norway, in 2014, entitled “Saving lives, by design: Using systems thinking To combat maternal mortality In India” (Bhatt, 2014).

This project tackles the complex issue of maternal death in India, by engaging a variety of diverse stakeholders over an eight-month period. The research uncovered several key stakeholder groups – including physicians, obstetricians, public health experts, Accredited Social Health Activists (ASHAs), rural midwives, and patients (pregnant mothers) – with compelling, yet not always aligned perspectives.

The project identified that the key stakeholder perspectives could be aggregated into three broad groups – between which there were significant tensions. The medical support personnel felt that the exploration space ought to be guided by technical solutions. The physicians and specialists valued approaches that featured improved care delivery methods. At the same time, the government and public healthcare experts felt that stronger policy approaches are likely the most promising element of any comprehensive solution approach.

The three key identified perspectives – those of physicians (clinical interventions), support personnel (technology), and public health experts (policy approaches) – represented sets of dynamic tensions that generated diverse and potentially incompatible solution spaces, that seemed as mutually exclusive.

Yet through the engagement, the design team was able to work with the inherent tensions and inflect the stakeholder perspectives in such a way as to identify common ground – which helped to generate several cohesive solution approaches that successfully addressed the core challenges and resulted in saving lives of women.

An analysis through the lens of tension manifolds as tensegrity structures is as per Table 1:

Table 1: 'Tension manifolds' stakeholder engagement analysis

Stakeholders	Alter ways of looking	Identify tension structures	Define inflection points
Physicians	Introduced diverse perceptions of the underlying issues around maternal mortality from the perspectives of other clinical specialists – and related them in terms of impact and priority.	Practitioner preferences for specific care solutions – that implied interpretative 'key causes' of the maternal mortality – was identified as a key tension structure.	Defined enhanced support of clinical procedures with new technologies along with availability of novel diagnostic tools as key inflection points for medical practitioners.
Support personnel	Surfaced the relationships between clinical interventions, environmental conditions (spaces where delivery takes place), and the technology / equipment – as relating to maternal mortality.	Difficulties with the equipment and key treatment components – such as the viable transport of an anti-coagulant drug in a hot climate – was noted as a key tension.	Defined opportunities for a heat-proof medicine transport ("battery operated oxytocin cooler"); "protein urea tester" & "a cellphone powered non-invasive anemia detector".
Public health experts	Related experiences of involved health-care practitioners in comprehensive, visual ways – demonstrating key challenges that may impact policy responses.	Challenges in policy formulation that effectively address diverse healthcare participant challenges was identified as a key tension structure.	Defined policy response opportunities as instruments of supporting new technologies and healthcare delivery methods (i.e., in rural areas).

Conclusion

Systemic issues feature dynamic complexity that challenges our static perceptions, limiting effective action within the 'super-wicked problems', 'social messes' and other complex social phenomena that are increasingly becoming an exigent priority for design. Thus, systemic designers are called to enable the exploratory work within dynamic tensions created by seemingly contradictory forces – such as paradoxes, differences, and breaks in context, scale, values and goals, among others – to create opportunities for exploration that help emerge enhanced outcomes. Although challenging, this can become a space of praxis – conceptualizing 'tension manifolds' as a design medium where the reflexive exploration can be harnessed to identify design affordances capable of enabling multi-stakeholder collaboration and collective action.

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