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"The Value of Critical Systems Practice and Systemic Design in Conflicts and Conflict Resolution"

Diploma thesis of

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Abstract

Conflicts have a profound impact on society, human development, and the overall well-being of individuals. Traditional approaches to conflict analysis and resolution often fail to capture the complexity and interconnectedness of conflicts, relying on linear causality and neglecting underlying issues. This thesis explores the value of critical systems practice (CSP) and systemic design as frameworks for conflicts and conflict resolution. CSP emphasizes systems thinking, critical awareness, pluralism, and improvement, promoting holistic understanding and interconnections. Systemic design addresses complex challenges by integrating design, research, and method skills, taking a holistic view of interconnected systems. By adopting these frameworks, conflicts can be approached with a systemic lens, enabling practitioners to raise awareness, challenge false consciousness, and empower marginalized stakeholders. The flexibility and adaptability of CSP and systemic design facilitate collaborative problem-solving and innovative interventions. Through their application, conflicts can be addressed in a nuanced, inclusive, and transformative manner, leading to positive social transformation and the resolution of conflicts.

Περίληψη

Οι συγκρούσεις αποτελούν σημαντικό φαινόμενο στην κοινωνία και έχουν επιπτώσεις τόσο στην ανθρώπινη ανάπτυξη όσο και στην ευημερία των ατόμων. Ωστόσο, η ανάλυση και η επίλυση των συγκρούσεων αποτελούν πολύπλοκη διαδικασία, καθώς συχνά απαιτείται να ληφθούν υπόψη η πολυπλοκότητα των παραγόντων που τις προκαλούν και οι αλληλεξαρτήσεις που εμπλέκονται. Στην παρούσα διπλωματική, εξετάζουμε την αξία της κριτικής πρακτικής συστημάτων (CSP) και του συστημικού σχεδιασμού ως πλαισίων για την αντιμετώπιση και επίλυση των συγκρούσεων.

Η CSP αποτελεί μια προσέγγιση που τονίζει τη συστημική σκέψη, την κριτική συνείδηση, τον πλουραλισμό και τη βελτίωση. Αντιμετωπίζει τις συγκρούσεις ως πολύπλοκά προβλήματα και προωθεί μια ολιστική κατανόηση τους, εστιάζοντας στις αλληλεξαρτήσεις μεταξύ των συνιστωσών τους. Ο συστημικός σχεδιασμός, από την άλλη πλευρά, επιδιώκει να δημιουργήσει βιώσιμα συστήματα, λαμβάνοντας υπόψη τη συνολική δομή και την αλληλεπίδραση των στοιχείων.

Η χρήση της CSP και του συστημικού σχεδιασμού στη διαχείριση των συγκρούσεων προσφέρει ορισμένα πλεονεκτήματα. Καταρχάς, διευκολύνει την αναγνώριση και κατανόηση των συστατικών των συγκρούσεων, συμπεριλαμβανομένων των πολυπλοκοτήτων, των αντιφάσεων και των αλληλεξαρτήσεων που ενδέχεται να υφίστανται. Δεύτερον, παρέχει μια ολοκληρωμένη προοπτική, που επιτρέπει στους ερευνητές και τους επαγγελματίες να εκτιμήσουν το πλαίσιο μιας συγκρούσεως, λαμβάνοντας υπόψη τις πολλαπλές διαστάσεις και τις δυνητικές συνέπειες. Τρίτον, παρέχει εργαλεία και μεθοδολογίες για την εξέταση και την αντιμετώπιση των συγκρούσεων, υποστηρίζοντας την ανάπτυξη πρακτικών που ευνοούν την επίλυση τους.

Επιπλέον, η CSP και ο συστημικός σχεδιασμός προσφέρουν ένα πλαίσιο για την ανάλυση των παραγόντων που συμβάλλουν στην πρόκληση και επιδείνωση των συγκρούσεων. Μέσω της αντίληψης των διαφόρων παραγόντων και της αλληλεπίδρασής τους, μπορεί να αναπτυχθούν προληπτικές και επαγγελματικές προσεγγίσεις που στοχεύουν στην πρόληψη και επίλυση των συγκρούσεων. Αυτό οδηγεί σε βελτιωμένη διαχείριση των συγκρούσεων και ενδυναμώνει την ανθρώπινη ανάπτυξη και ευημερία.

Ωστόσο, παρά τα πλεονεκτήματα της CSP και του συστημικού σχεδιασμού, υπάρχουν και ορισμένες προκλήσεις που πρέπει να αντιμετωπιστούν. Η πολυπλοκότητα, η αβεβαιότητα και οι αντιφάσεις που συνδέονται με τις συγκρούσεις καθιστούν δύσκολη την ανάλυσή τους και την ανάπτυξη αποτελεσματικών πρακτικών επίλυσης. Επιπλέον, η εφαρμογή της CSP και του συστημικού σχεδιασμού απαιτεί την κατάλληλη εκπαίδευση και επαγγελματική κατάρτιση των εμπλεκόμενων μερών.

Συνοψίζοντας, η CSP και ο συστημικός σχεδιασμός αποτελούν πλαίσια που ενισχύουν την αντιμετώπιση και επίλυση των συγκρούσεων, επιτρέποντας την ολοκληρωμένη κατανόηση και την ανάπτυξη αποτελεσματικών πρακτικών. Η εφαρμογή τους μπορεί να οδηγήσει σε βελτιωμένη διαχείριση των συγκρούσεων και να συμβάλει στην ανθρώπινη ανάπτυξη και ευημερία. Ωστόσο, προκειμένου να επιτευχθούν αυτά τα αποτελέσματα, απαιτείται η αντιμετώπιση των προκλήσεων που συνδέονται με την ανάλυση και επίλυση των συγκρούσεων.

1 Introduction

Conflicts have a profound impact on societies, human development, and the overall well-being of individuals. They disrupt communities, hinder progress, and tragically result in the loss of countless lives. By examining the historical trajectory of conflicts since 1946 and analyzing the share of annual deaths attributed to conflicts, it becomes evident that conflicts are a significant concern for humanity. The charts depicting the number of conflicts over time (Figure 1) and the proportion of annual deaths attributed to conflicts (Figure 2) provide compelling evidence of the gravity of the situation.
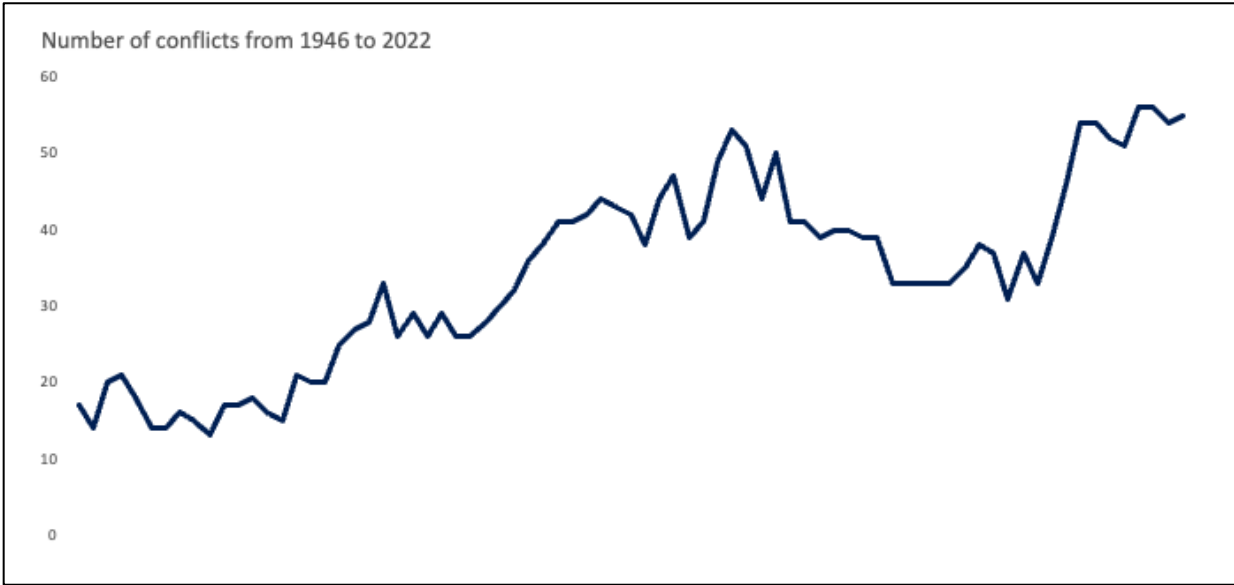
Figure 1 Number of conflicts from 1946 to 2022

Source 1: (Davies, Shawn, Pettersson, & Öberg, 2023)

Source 2: (Gleditsch, et al., 2002)

Cardiovascular diseases	18.56 million
Cancers	10.08 million
Respiratory diseases	3.97 million
Digestive diseases	2.56 million
Lower respiratory infections	2.49 million
Neonatal disorders	1.88 million
Dementia	1.62 million
Diabetes	1.55 million
Diarrheal diseases	1.53 million
Liver diseases	1.47 million
Kidney diseases	1.43 million
Road injuries	1.2 million
Tuberculosis	1.18 million
HIV/AIDS	863,837
Suicide	759,028
Malaria	643,381
Homicide	415,180
Parkinson's disease	362,907
Nutritional deficiencies	251,577
Drowning	237,242
Meningitis	236,222
Protein-energy malnutrition	212,242
Maternal disorders	196,471
Alcohol use disorders	168,015
Drug use disorders	128,083
Fire	111,292
Hepatitis	79,176
Poisonings	77,162
Conflict and terrorism	62,985
Heat (hot and cold exposure)	47,461
Natural disasters	6,076

Figure 2 Number of deaths by cause, World, 2019

Source: (IHME, 2019)

However, traditional approaches to conflict analysis and resolution often fall short in effectively addressing the complex and multidimensional nature of conflicts. These approaches tend to be one-dimensioned, relying on linear reasoning that assumes a single cause for a particular effect. Such linear causality oversimplifies the intricate dynamics underlying conflicts and fails to capture their systemic nature.

Moreover, static conflict analysis merely offers a snapshot of a specific moment, neglecting the underlying problems and issues that contribute to the conflict's persistence. On the other hand, dynamic conflict analysis provides a more comprehensive understanding of the interactions and causal factors at play, identifying triggers and patterns of conflict evolution. However, even

dynamic analysis may not fully grasp the complexity of conflicts, especially as they become more intricate.

Linear cause-effect thinking, commonly employed in conflict analysis, is ill-suited for capturing the systemic nature of conflicts. To adequately comprehend conflicts, a shift in mindset is required—one that considers systems boundaries, interconnections, feedback loops, and emergent behavior. Systemic conflict analysis embraces high levels of uncertainty and acknowledges the absence of definitive answers. Unfortunately, even when practitioners employ systemic approaches, they often rely on system dynamics (SD), which has its limitations when applied to complex-coercive problems like conflicts.

System dynamics, though useful in certain contexts, can encounter communication and coordination issues due to differing values and agendas among involved groups. Additionally, the determination of feedback loops and defining what is "right" can pose significant challenges in SD. Furthermore, SD models may inadvertently privilege the perspectives of powerful groups while excluding marginalized voices. These models sometimes oversimplify relationships, ignoring cultural, political, ethical, and coercive factors. Consequently, SD is better suited for complicated problems with identifiable cause-effect relationships and a limited number of agents.

The implications of not approaching conflicts with the appropriate systemic framework are far-reaching. Without a systemic understanding, conflicts cannot be addressed in the most effective manner. Linear thinking perpetuates mechanistic and deterministic interventions that fail to consider the complexity and interdependencies of conflicts. Such interventions often exacerbate the suffering of the most affected individuals and communities. Furthermore, by excluding

marginalized stakeholders, the oppressed remain voiceless and continue to endure the consequences of conflicts without the opportunity to effect meaningful change.

To address these limitations, this thesis proposes the value of critical systems practice (CSP) and systemic design as comprehensive frameworks for conflicts and conflict resolution. Critical systems practice is a multimethodology that emphasizes systems thinking, critical awareness, pluralism, and improvement. It encourages a holistic understanding of conflicts, moving away from reductionism.

CSP comprises four phases: creativity, choice, implementation, and reflection. In the creativity phase, creativity-enhancing devices and systems perspectives are employed to identify major issues in the problem situation. The choice phase involves selecting suitable systems methodologies based on the identified issues and perspectives. The implementation phase puts the chosen methodologies into action to address the identified issues, ensuring flexibility and iteration. Finally, the reflection phase evaluates the intervention's results, providing knowledge for further research.

Systemic design, as a complementary approach to CSP, integrates design, research, and method skills to address complex challenges. It adopts a holistic view, employing tools like systems maps to facilitate learning, design, knowledge creation, and action. Systemic design intervenes in higher-order systems to effect change in desired contexts, drawing from disciplines such as systems thinking, design thinking, sociology, and management theory.

The principles of systemic design, including idealization, appreciating complexity, purpose finding, boundary framing, requisite variety, feedback coordination, system ordering, leverage

impact, generative emergence, continuous adaptation, and self-organizing, offer a comprehensive framework for conflict resolution and positive social transformation.

By adopting critical systems practice and systemic design, conflicts can be approached with a deep understanding of their systemic nature. These frameworks enable practitioners to raise awareness, challenge false consciousness, and empower oppressed groups to effect meaningful change. The flexibility and adaptability of these methodologies ensure that conflicts are addressed through collaborative problem-solving and innovative interventions, rather than perpetuating linear thinking and deterministic approaches.

In conclusion, conflicts pose significant challenges to societies and individuals alike. Traditional conflict analysis and resolution approaches often fall short in comprehending the complexity and interdependencies of conflicts. By embracing critical systems practice and systemic design, conflicts can be effectively addressed with a systemic lens, leading to more nuanced, inclusive, and transformative interventions. These frameworks offer the potential to empower marginalized voices and promote positive social change, thereby contributing to the resolution of conflicts and the betterment of societies as a whole.

In this diploma thesis, we will deep dive into the literature of conflicts, conflict resolution, systems thinking, critical systems practice, and systemic design to answer these research questions:

1. What is the value of critical systems practice to conflicts and conflict resolution?
2. What is the value of systemic design to conflicts and conflict resolution?

2 Conflict

2.1 Overview of conflict

Conflict is a universal feature of human society (Ramsbotham, Woodhouse, & Miall, 2016, p. 9) often used to describe a state of disagreement, discord, or antagonism between individuals or groups. According to the (Merriam-Webster, (n.d.)), conflict is termed as a competitive or opposing action of incompatible; antagonistic state or action (as of divergent ideas, interests, or persons).

Scholars have long been interested in understanding the nature and significance of conflict. One early influential perspective was that of sociologist Lewis Coser, who argue that conflicts are necessary for change in human society since they help to build relationships in groups, establish a group's identity, build internal cohesion in groups and can lead to balance of power in society as well as create new rules and laws (Coser, 1956). While some believe that conflict serves as a means of resolving disputes and negotiating social change, others have focused on the negative aspects, such as its potential to escalate violence or cause to harm to individuals and groups.

One important dimension of conflict is its intensity. Conflict can range from mild disagreements to intense disputes that involve physical violence. Scholars have also distinguished between different types of conflict, such as intrapersonal (inner conflict), interpersonal (conflict between individuals), intergroup (families, neighborhoods, affiliations, etc.), international, regional, global (Ramsbotham, Woodhouse, & Miall, 2016, p. 10).

The significance of conflict is multifaceted. On the one hand, conflict can be a source of stress, anxiety, and harm to individuals or groups. It can lead to negative emotions, such as anger,

frustration, and resentment, and can strain relationships and social cohesion. On the other hand, conflict as mentioned before, can serve as a catalyst for positive change and social progress. By exposing differences and challenging existing power structures, conflict can pave the way for new ideas, social movements, and political reforms.

Overall, conflict is a complex and multifaceted phenomenon that has captured the attention of intergovernmental organizations e.g., United Nations (UN), academics, nations, etc. Individuals can be affected by conflict in both negative and positive ways (Lederach, 2003), but sometimes it can be a critical partner of innovation and societal transformation. Understanding its significance, it can be essential tool for addressing social problems and promoting social justice.

2.2 Conflict resolution

2.2.1 Definitions and key concepts

Conflict resolution is a process of managing and resolving disagreements or disputes between two or more parties. It involves a set of skills, techniques, and strategies that aim to identify, address, and resolve underlying causes of the conflict, as well as to prevent its escalation and recurrence in the future. Conflict resolution is important in various settings, including interpersonal relationships, organizations, communities, nations, etc.

The first key concept of conflict resolution lies in its definition. Conflict resolution can be defined as the informal or formal process that two or more parties use to find a peaceful solution to their dispute (Shonk, 2022). At its best version. it involves a collaborative approach that seeks to address the underlying causes of the conflict and to find mutually acceptable solutions that meet the needs and interests of all parties involved.

The second key concept of conflict resolution is in its dynamic and complex nature as they

escalate and de-escalate and are affected by a complex interplay of attitudes and behaviors. Due

to the complexity, it is often seen that third parties get involved in the resolution process, to

provide either mediation or different perspective to the problem, but more often than not, they

may become parties in an extended conflict. An important point to mention is that of Morton

Deutsch (Deutsch, 1949) distinguished between destructive and constructive conflict, explaining

that the former was to be avoided and the latter, as a necessary aspect of creativity. The field of

conflict resolution tries to challenge the understanding of conflict, in order to transform it from a

destructive part of human activity to an opportunity of growth. In contrast to older established

fields, such as international relations, conflict resolution based on (Ramsbotham, Woodhouse, &

Miall, 2016) was to be:

- Multi-level: analysis and resolution had to embrace all levels of conflict and types as
  mentioned previously; intrapersonal (inner conflict), interpersonal (conflict between
  individuals), intergroup (families, neighborhoods, affiliations, etc.), international,
  regional, global.

- Multidisciplinary: to learn how to address complex conflict systems, the field had to draw
  from many different disciplines, those including politics, international relations, strategic
  studies, development studies, individual, and social psychology, etc.

- Analytic and normative: The foundation of the study of conflict was to be systematic
  analysis and interpretation of the "statistics of deadly quarrels" (polemology), but this
  was to be combined from the outset with the normative aim of learning how better
  thereby to transform actually or potentially violent conflict into non-violent processes of
  social, political, and other forms of change.

- Theoretical and practical: the conflict resolution field was to be constituted by a constant mutual interplay between theory and practice: only when theoretical understanding and practical experience of what works and what does not work are connected, can properly informed experience develop.

The third key concept of conflict resolution is about the current framework models that are applied, such as:

- Johan Galtung's (Galtung, 1969) model of conflict, violence, and peace. The model offers a simplified explanation of the relationship between conflict, violence, and peace. Galtung explains that conflict can be viewed in the form of a triangle, with contradiction (C), attitude (A), and behavior (B) at its vertices. Contradiction (C) refers to the actual or perceived underlying conflict situation that includes an unalignment of goals between parties. Attitude (A) refers to the influence of different emotions such as fear, anger, bitterness, and hatred. Finally, behavior (B) includes cooperation or coercion, gestures that imply conciliation or hostility. Galtung argues that all the above components must be present at the same time for "full" conflict to exist.
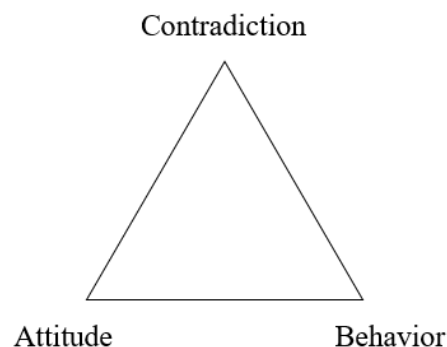
Figure 3 Galtung's model of conflict, violence, and peace

- A model from (Ramsbotham, Woodhouse, & Miall, 2016) to understand conflict escalation

  and de-escalation. Since conflicts can be susceptible to rapid changes due to their dynamic

  nature or even remain stable for long periods of time until they escalate unpredictably, are

  difficult to manage and anticipate. New issues and conflict parties can emerge and affect the

  dynamics of the situation, but in the figure below 1.2, a more "normal" distribution curve,

  from the initial incompatibilities of goals, through the emergence of an original contradiction

  that may or may not remain latent, on up through the process of polarization in which

  opposing parties are formed, and the conflict manifests.
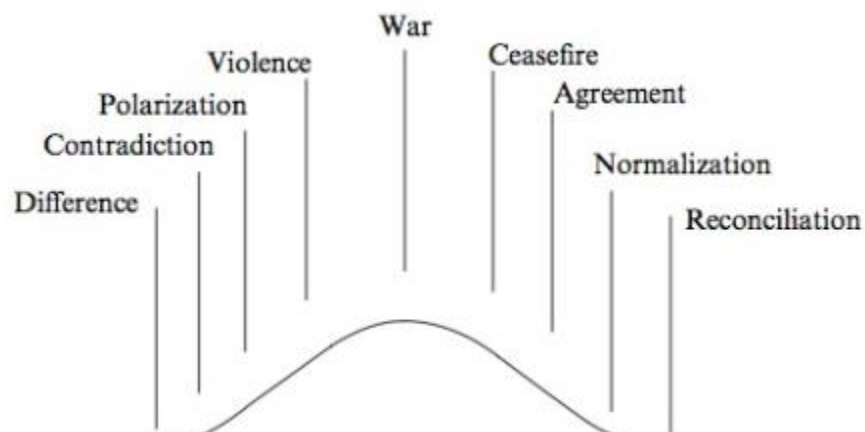
Figure 4 Conflict escalation and de-escalation

- The hourglass model outlines the spectrum of conflict resolution responses. Combining

  Galtung's triangle (Figure 3) and the conflict escalation and de-escalation curve (Figure 4),

  (Ramsbotham, Woodhouse, & Miall, 1999) (Figure 5) created the hourglass model which

  represents the narrowing political space that characterized conflict escalation (top half of

  hourglass model) and the widening of political space that characterizes de-escalation (bottom

half of the hourglass model). As the space is widening and narrowing so as the different

conflict resolution responses are feasible.

Conflict transformation	Difference	Cultural peacebuilding
	Contradiction	Structural peacebuilding
Conflict settlement	Polarization	Peacemaking
	Violence	Peacekeeping
Conflict containment	WAR	War limitation
	Ceasefire	Peacekeeping
Conflict settlement	Agreement	Peacemaking
	Normalization	Structural peacebuilding
Conflict transformation	Reconciliation	Cultural peacebuilding

Figure 5 The hourglass model: conflict containment, conflict settlement, and conflict transformation

Table 1 Conflict resolution techniques, complementarity, and the hourglass model

Stage of conflict	Strategic response	Examples of responses and capacity
Difference	Cultural peacebuilding	• Problem-solving • Support for indigenous dispute-resolution and conflict resolution training • Fact-finding missions and peace commissions • Culture of toleration and respect • Multiple and inclusive identities
Contradiction	Structural peacebuilding	• Development assistance • Civil society development

		• Governance training and institution building
		• Human rights training
		• Track II mediation and problem-solving
		• Institutional capacity
		• Constitutional and legal provision
		• Legitimacy and social justice
Polarization	Elite peacemaking	• Special envoys and official mediation
		• Negotiation
		• Coercive diplomacy
		• Preventive peacekeeping
Violence	Peacekeeping	• Interposition
		• Crisis management and containment
War	War limitation	• Peace enforcement
		• Peace support and stabilization
Ceasefire	Peacekeeping	• Preventive peacekeeping
		• Disarmament and security sector reform
		• Confidence building and security enhancing measures
		• Security in the community through police training
Agreement	Elite peacekeeping	• Electoral and constitutional reform
		• Power sharing and de-centralization of power
		• Problem-solving
Normalization	Structural peacebuilding	• Collective security and cooperation arrangements
		• Economic resource cooperation and development
		• Alternative defense
Reconciliation	Cultural peacebuilding	• Commissions of enquiry/truth and justice commissions
		• Peace media development
		• Peace and conflict awareness education and training
		• Cultural exchanges and initiatives, sport as reconciliation
		• Problem-solving as future imagining

- In (Table 1) (Ramsbotham, Woodhouse, & Miall, 2016) suggest different conflict resolution techniques based on the hourglass model's stages of conflict. As the space widens the more techniques are available to use, and as the space narrows the options become really limited. For example, the most violent stages of conflict i.e., violence and war, the suggestions are very limited and really difficult to apply. This observation enforces the argument that conflict's prevention should be one of the most important goals for the resolver, because in

that stage there is a variety of options and the complexity is really high, thus the variety is

high as well. On the opposite side, violence and war are so dynamic to the point that the

conflict system is heading to a chaotic and volatile state, where the resolver has to deal with

high levels of unpredictability without guaranteed success.

- Another influential model is the "conflict tree" (Fisher, et al., 2000) (Figure 6), an exercise

  for analyzing the causes and effects of a conflict. It can be input for another model named

  "systems mapping". The conflict tree tries to identify key drivers of a conflict situation and

  address the root causes and the effects of the problem. Effects are the current or past

  manifestations of the conflict. Causes are usually long-term structural issues, underlying

  factors that result into a range of problems and conflicts. They do shift slowly over time, but

  usually require sustained efforts to include change. It is advised for collective use instead of

  individual since it encourages stimulating reflections on different perspectives.
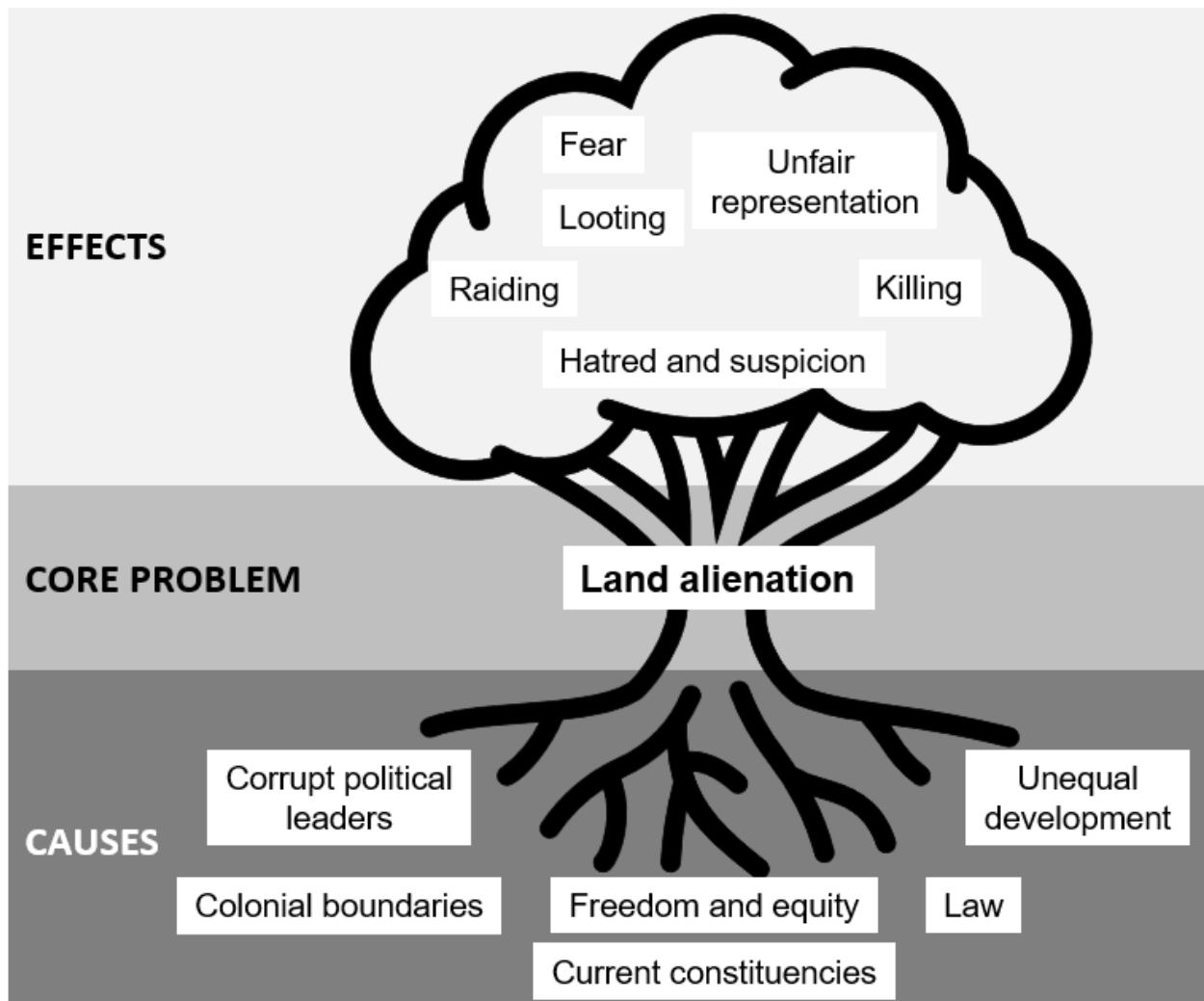
Figure 6 The conflict tree: an example from Kenya's land alienation

- One of the earliest frameworks for understanding and creating intervention strategies for

  conflict, is game theory. It played a prominent role in strategic studies for exploring ideas

  and models of decision-making. Generally, game theory uses numeric models and analytical

  tools to explore impact and consequences of alternative solutions and explain how decision-

  makers choose between competition and cooperation. The concept is that each player's best

  choice is dependent on those of its counterpart to an extent that it cannot decide unilaterally

  which action to undertake. This phenomenon forces the player to consider what the other

party is thinking or planning to do and adjust their decision-making accordingly. The purpose of game theory is in analyzing the rational behavior of interdependent actors.

An example given is (Figure 8) trying to connect the different approaches to conflict by suggesting an analogy from a famous game theory-based scenario "The prisoner's dilemma".

Concern for Other

Yielding   Problem-solving

              Compromising

Withdrawal   Contending

Concern for Self
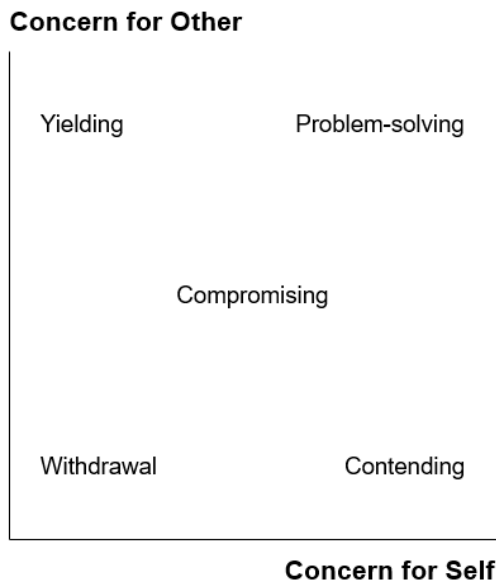
Figure 7 Five approaches to conflict

Source: from (Katz & Lawyer, 1985)

Prisoner's dilemma:

"Bonnie and Clyde have been arrested for robbing a bank and placed in separate cells. Both care much more about their personal freedom than about the welfare of their accomplice. A clever prosecutor makes the following offer to each: "You may choose to confess or remain silent". If you confess and your accomplice remains silent, I will drop all charges against you and use your testimony to ensure that your accomplice does serious time. Likewise, if your accomplice confesses while you remain silent, they will go free while you do the time. If you both confess, I get two convictions, but I'll see to it that you both get early parole. If you both remain

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silent, I'll have to settle for token sentences on firearms possession charges. If you wish to

confess, you must leave a note with the jailer before my return tomorrow morning."

Table 2 Prisoner's dilemma

	Cooperate	Defect
Cooperate	3,3	0,5
Defect	5,0	1,1

In the prisoner's dilemma (Table 2) game's matrix, there are four different possible outcomes

(Rapoport & Chammah, 1965):

- If Bonnie and Clyde cooperate-cooperate (both confess to the inspector), the value (3,3)

  is symmetrical for both, so it's a win-win situation.

- If Bonnie and Clyde cooperate-defect (Bonnie remains silent and Clyde confesses), then

  Bonnie's value is 0 and Clyde's 5, so this is a lose-win outcome.

- If Bonnie and Clyde defect-cooperate (Bonnie confesses and Clyde remains silent), then

  Bonnie's value is 5 and Clyde's 0, so this is a win-lose outcome.

- If both choose to remain silent, the value is (1,1), which is a lose-lose outcome.
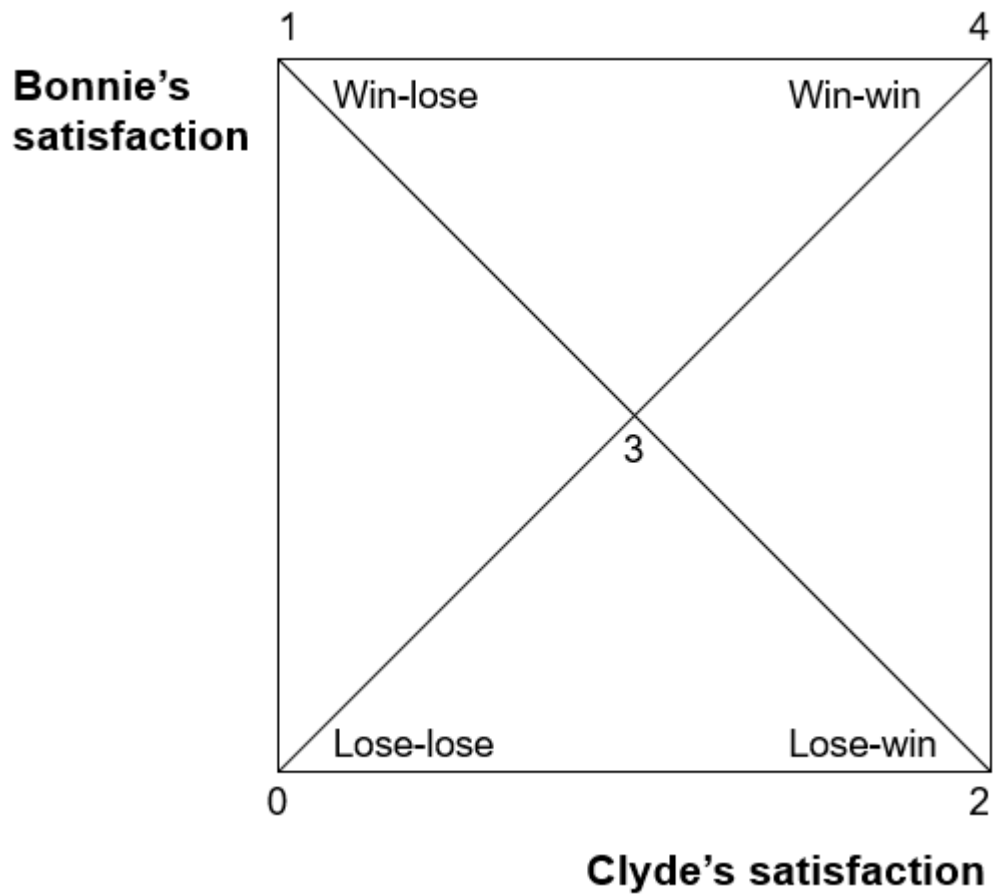
Figure 8 Zero-sum and non-zero-sum outcomes for prisoner's dilemma

In this chapter there was reference to some of the most popular framework models for conflict analysis and resolution, in general there are more choices in the literature (Table 3), but the analyst is responsible of choosing the most appropriate depending on the conflict situation, stage and goal of the strategy.

Table 3 Conflict analysis tools and usage suggestions

Source: (Oliva & Charbonnier, 2016)

Level of analysis	Phase	Tool	Desk analysis	Rapid analysis	Structured analysis
Static conflict analysis	Desk review	Review of previous analyses		✓	✓
		Literature review			✓
	Situation profile	Timeline	✓	✓	✓
		Curve of conflict			✓
		Conflict arena and geographical map			✓
		Escalation stages			✓
		Issue matrix		✓	✓
	Causal analysis	Iceberg	✓	✓	✓
		Pillars		✓	✓
		Levels of conflict			✓
		Conflict tree		✓	✓
		Conflict triggers			✓
	Stakeholder analysis	Stakeholder inventory	✓	✓	✓
		Onion		✓	✓
		Stakeholder matrix		✓	✓
		Stakeholder map	✓	✓	✓
		ABC triangle			✓
		Pyramid		✓	✓
Dynamic conflict analysis	Analysis of peace and conflict dynamics	Review of past responses			✓
		Force-field analysis			✓
		Connectors and dividers	✓	✓	✓
		Peace profile matrix	✓	✓	✓
		Issues synergies diagram		✓	✓
		Conflict trends			✓
		Scenario building			✓
Systemic conflict analysis	Systems thinking	Conflict boundaries			✓
		Key driving factors			✓
		Reinforcing and balancing loops			✓
		Mental models			✓
		Archetypes			✓
		Leverage points			✓

In this diploma thesis, the focus is around the last level of analysis "systemic conflict analysis", and the scope is to discover the role of systems thinking in the conflict resolution field in terms of analysis, as well as the value that the design field could bring to the implementation of interventions.

2.3 Limitations of current conflict analysis and resolution approaches

The new era of conflicts and violence have changed tremendously the last decades. Conflicts now tend to be less deadly and often waged between domestic groups rather than states (UN75). A broad variety of actors, from governments to multilateral and non-governmental organizations, are trying to terminate conflicts by making interventions to areas of crisis, but traditional approaches to conflict resolution and peacebuilding initiatives aren't adequate in dealing with high levels or complexity. A quick observation to the aforementioned conflict resolution approaches can indicate how one-dimensioned the conflict resolution and analysis tools are, due to ignoring the interconnectedness and dynamics of the elements in a conflict situation. As conflicts get more complex, the conceptualization and simplistic approach of linear types of reasoning; "an x cause is responsible for the y effect", are bound to fail due to the ignorance of feedback loops, the complex dynamics that enable conflicts to change over time to an uncertain direction.

Each level of analysis (Table 3) has its advantages and disadvantages on dealing with conflict situations, but what are those actually?

- Static conflict analysis is like taking a snapshot of a specific point of time. It does not look at the underlying issues or problems, but rather generates a broad descriptive glimpse of the context in a specific moment (Oliva & Charbonnier, 2016). It is useful as a quick diagnostic tool to assess the conflict situation at hand, based on some key characteristics; the actors' profile, the history of the involved parties, the key stakeholders and their indicative influence, as well as a brief look to the stage of conflict in terms of

the escalation curve (Figure 4). In conclusion, they investigate and provide with an analytical description of a conflict at specific time.

- Dynamic conflict analysis is suited when the analyst wants to grasp the dynamics of the interactions that take place between stakeholders and the identified causes of conflict. It provides valuable information that can be leveraged as an input for action, because it establishes connections and mutual influence among different causal factors of the conflict. Also, it can identify triggers that influence the state of the conflict once the static analysis has been completed, as well as help define the patterns of the evolution of the conflict.

- Systemic conflict analysis requires a change of approach and mindset from the analyst, shifting away from a linear cause-effect way of thinking into an understanding of systems boundaries, interconnections between the parts of the whole system, dealing with high levels of uncertainty and no definite answers, looking at the feedback loops and the emergent behavior of the system. A deeper dive will be provided, trying to outline the benefits of approaching conflict with a "systems thinking" lens, the current methodologies and tools used by conflict analysts and practitioners, and the limitations. The CDA Collaborative Learning Projects (CDA, Conflict Systems Analysis: Benefits and Practical Application) mentions that a systems analysis is usually useful when:
    - Repeated efforts to resolve the problems at hand haven't been successful, meaning that there are chronic issues that need to be addressed.
    - Multi-actor involvement to address the issues haven't achieved greater collective impact.
    - The problems at hand produce multiple and often contrasting characteristics.

- Short term and quick solutions have failed.

3 Systems thinking

3.1 General system theory

General system theory is an interdisciplinary study of system's organization, regardless of their material, specific, and spatiotemporal substrate. Systems theory investigates the common principles of complex entities and the models that describe them.

System theory was first introduced in 1940 by the biologist Ludwig von Bertalanffy, who opposed the limitation of sciences and their reduction to the laws of physics. Thus, he argued that real systems are open and interact with their environment, qualitatively differentiating their properties and constantly evolving.

The primary goal of systems theory was the theoretical construction of models that would extend between the high-level constructs of pure mathematics and the specific theories of specialized scientific fields.

The term "system" can be defined as a group of interacting parts, which function as a whole separated from its environment by recognized dividers (borders). A system has properties that they are not found in its individual elements but emerge through it functioning as a whole. These properties are analyzed in the highest level of description (e.g., a machine has properties not seen in valves, pistons, or any other part of it) (Spyrou & Arnellos, 2002).

3.2 Cybernetics

Norbert Wiener defined cybernetics as the study of "control and communication in the animal and the machine" (Wiener, 1948). Cybernetics is concerned with concepts at the core of

understanding complex systems such as learning, cognition, adaptation, emergence, communication, and efficiency (Marinescu, 2017). Opposing to General System Theory that studies the system at all levels of generality (abstract approach), Cybernetics focuses more on systems that are directed towards a purpose, a pursuit, systems that have a destination that ultimately guides their functions (goal-directed systems, e.g., humans) (Spyrou & Arnellos, 2002). Cybernetics are considered to have two different orders:

- First-order Cybernetics (see (Umpleby, 2016)) is the "cybernetics of observed systems"; an engineering approach that seeks to provide objective knowledge about feedback loops and concentrates on promoting our ability to exercise control. It emphasizes the degree of openness or closedness in relation to the boundaries of the system, to what degree is information able to permeate in and out of the system.

  A negative feedback control system is characterized by a closed-loop structure (Jackson, Critical System Thinking and the Management of Complexity, 2019) that aims to stabilize the system, bringing its deviations back to a state of equilibrium. It can be used to interrupt the "explosive" path of positive feedback, leading the system towards an adaptive behavior, maintaining its speed, temperature, direction, etc.

  For the negative feedback system to maintain control, four elements are required (Jackson, Critical System Thinking and the Management of Complexity, 2019):

  - A desired goal, which is conveyed to the comparator from outside the system.
  - A sensor (a means of sensing the current state of the system).
  - A comparator, which compares the current state and the desired outcome.

- An activator (a decision-making element that responds to any discrepancies discovered by the comparator in such a way as to bring the system back toward its goal)
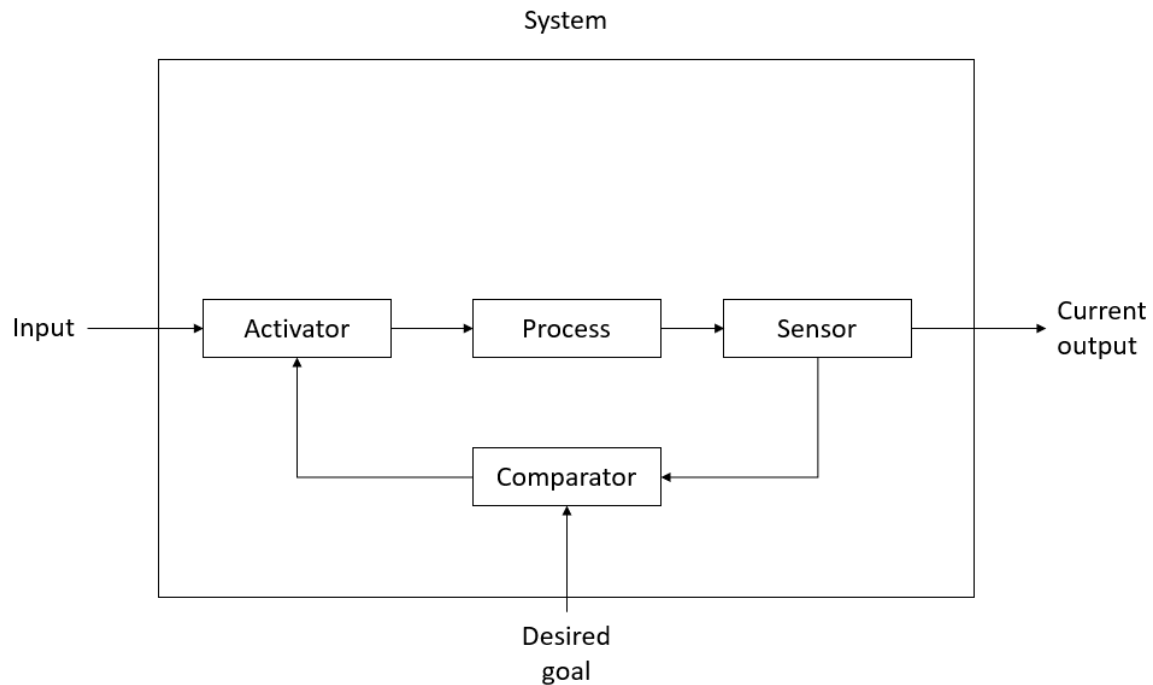
Figure 9 A closed-loop feedback system.

Source: (Jackson, Critical System Thinking and the Management of Complexity, 2019)

- Second-order Cybernetics' or "the Cybernetics of Cybernetics" epistemology is constructivism. Ernst von Glasersfeld defines radical constructivism with the following two basic principles:

  - Knowledge does not enter the subject passively through its senses or through communication but is actively built by the cognitive subject.

- The function of cognition (the cognitive function) is adaptive and serves the subject in organizing the empirical world, not in discovering an objective ontological reality.

To summarize the above information, in first-order cybernetics, the observer is considered to be external to the observed system, and the system is assumed to be objective and independent of the observer. Second-order cybernetics, on the other hand, recognizes that the observer is an active participant in the system being observed, and that the observed system and the observer are mutually influenced.

3.3 Complexity

It has been argued by (Gleick, 1987) that "chaos theory", the forerunner of "complexity theory", is one of the three landmark achievements of twentieth-century science. In order to describe "complexity theory", first there is need to identify its parts and describe them precisely. Following (Stacey, Griffin, & Shaw, 2000), there are three important aspects of "complexity theory":

- Chaos theory is a branch of mathematics that studies the behavior of dynamical systems highly sensitive to initial conditions. Small changes in the initial conditions can lead to vastly different outcomes over time.
  First developed in the 1960s by Edward Lorenz, who was working on the problem of long-range weather forecasting.
  To understand chaos theory, it is important to refer to linearity; the existence of which has as result the equal ratio of effects and their causes. For example, if a car is pushed by

a person, due to being out of gas, and the desired goal is to move it with double the current speed, then the person has to push twice as hard force. In this situation, it is expected that the car will be moved twice as fast, thus thinking linearly in this situation is logical. The result of the effect equals the cause.

Lorenz discovered that weather systems are extremely sensitive to changes in initial conditions. Slightly different initial conditions will change their behavior in a non-predictable way, but they do demonstrate similar patterns. The key takeaway is that although at first sight it appears that they system is dynamic and unpredictable without presenting any signs of organization, Lorenzo's attractor (Figure 10) proves that there is an organization in chaotic systems in their pattern.

Figure 10 The Lorenzo attractor.

Source: (Gleick, 1987)

Due to the system never exactly repeating itself, the trajectory never intersects itself. Instead, it loops around and around forever. Motion on the attractor is abstract, but it conveys the flavor of the motion of the real system. For example, the crossover from one wing of the attractor to the other corresponds to a reversal in the direction of spin of the

waterwheel or convecting fluid (Jackson, Critical System Thinking and the Management of Complexity, 2019).

- Dissipative structures are systems that continually produce entropy from inside to outside of their boundaries, thus affecting their environment's organization. In this way, they can increase their order (negative feedback loops i.e., complexity). The most well-known dissipative structure is the so-called Benárd instability:
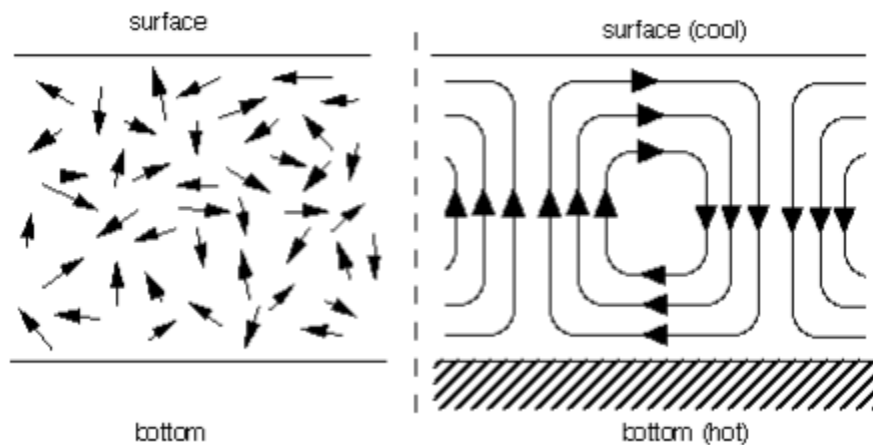
Figure 11 Benárd's instability

Source: (Spyrou & Arnellos, 2002)

In Benárd's instability (Figure 11), on the left the liquid molecules inside the container are moving in a randomly manner. On the right picture, the liquid molecules inside the container are subjected to an increase of temperature uniformly from the bottom of the container, while its surface is subjected to a decrease of temperature. The hot part of the liquid is lighter than the cold, therefore tries to rise to the surface of the vessel, while the cold liquid tries to sink. Due to the inability of simultaneous movements in opposite

directions, a self-organized flow of movement is emerging in the form of hexagonal cells or forming series of parallel rotations, thus the liquid has upwards and downwards flow.

In summary, the emergence of spontaneous new structures like in the example above, is a phenomenon that is observed in nature and laboratories, and it means that self-organization can occur without the intervention of an outside agent. It contradicts with the linear causation and the second law of thermodynamics, that a system if set free, it will increase its entropy. For example, when we observe a system that seems to have an organization e.g., a beautiful garden, intuitively we assume that an outside agent brought structure and is responsible for the design.

- Complex adaptive systems are systems that consist of interconnected components or agents that interact with each other and with their environment. The agents are capable of learning and adapting their behavior as they interact with other agents. These interactions enable the emergence of self-organized structures thus emergent behavior and properties. Examples of complex adaptive systems include ecosystems, economies, societies, conflict systems, the human brain, etc. These systems can exhibit a wide range of behaviors, from very simple to very complex and unpredictable. However, these systems have some principal properties that although they can be unpredictable, they fall in a general pattern of behavior e.g., Lorenzo's attractor (see figure 8).

In this section, there was an outline of key principles regarding "complexity theory" in order to understand its definition and its parts. Generally, there is no acceptable definition for complexity in the literature, but researchers believe that there is a common objective meaning on the term. Going back to its Latin root of the word "complexus" which means to complicate, to twist, to

tighten, the following message emerges: in order to have a complex there is need of two or more elements, which are connected to each other in such a way that is really difficult to separate them (Spyrou & Arnellos, 2002). As the number of elements and connections increases, so as the difficulty to understand the collective behavior increases, thereby, the "complexity" increases.

3.4 Review of systemic approaches to conflict

In this section a deeper dive to some of the most important and insightful manuals, guidebooks, and papers that incorporate systemic approaches to conflict analysis, resolution, and transformation, where a critical review will take place.

3.4.1 CDA Collaborative Learning Projects approach

The CDA in its resource manual (CDA, Designing Strategic Initiatives to Impact Conflict Systems: Systems Approaches to Peacebuilding. A Rersource Manual, 2016), introduces systems thinking to conflict analysis, the benefits and when it is helpful to apply systems approaches to conflict analysis. They mention that systems thinking is a way of seeing to better understand how a system is behaving. Peacebuilding is not a linear process where a specific set of steps and instructions are followed, then the desired outcome will eventually emerge. CDA firmly supports that systems thinking tools can:

- Can help change the belief of theories about how positive social change can be achieved.
- Identify the bottlenecks that make the system resilient to positive change.

- Optimize the process of strategic planning to deploy interventions by targeting the most critical issues and stakeholders.

- Help anticipate and inform effective responses to unexpected developments.

The CDA (CDA, Designing Strategic Initiatives to Impact Conflict Systems: Systems Approaches to Peacebuilding. A Rersource Manual, 2016) proposes a tool they call systems mapping that provides a new perspective, a visual representation of conflict dynamics in action – demonstrating how conflict factors, cause, affect, and "communicate" with each other. Mapping is supposed to reduce unconscious bias and enable a clearer and accurate analysis of the situation. Although they note that systems thinking tools do not replace traditional frameworks and methods, they provide new insights and perspectives to the analysis. Due to the emphasis on conflict dynamics, systems approaches are able to capture gaps and shortfalls that traditional analytical frameworks sometimes may miss. By using systems thinking they believe that:

- Prioritize problems easier because systems thinking allows to depict dynamic relationships instead of using the lists of conflict issues that traditional analysis frameworks produce, thus adding insights that are useful for programming decisions.

- Getting on top of unintended consequences of peace programming that conflict analysis frameworks fail to identify.

- Mapping the sub-systems and behaviors of the system, can prevent failing solutions from being applied. It makes testing theories of change easier and safer.

- Enhance the relevance of the program by insuring it is focused on the true drivers of the conflict.

The tool that the CDA use is a systems map which basically is the systems dynamics methodology. An example of the produced outcome can be seen below (see Figure 7)

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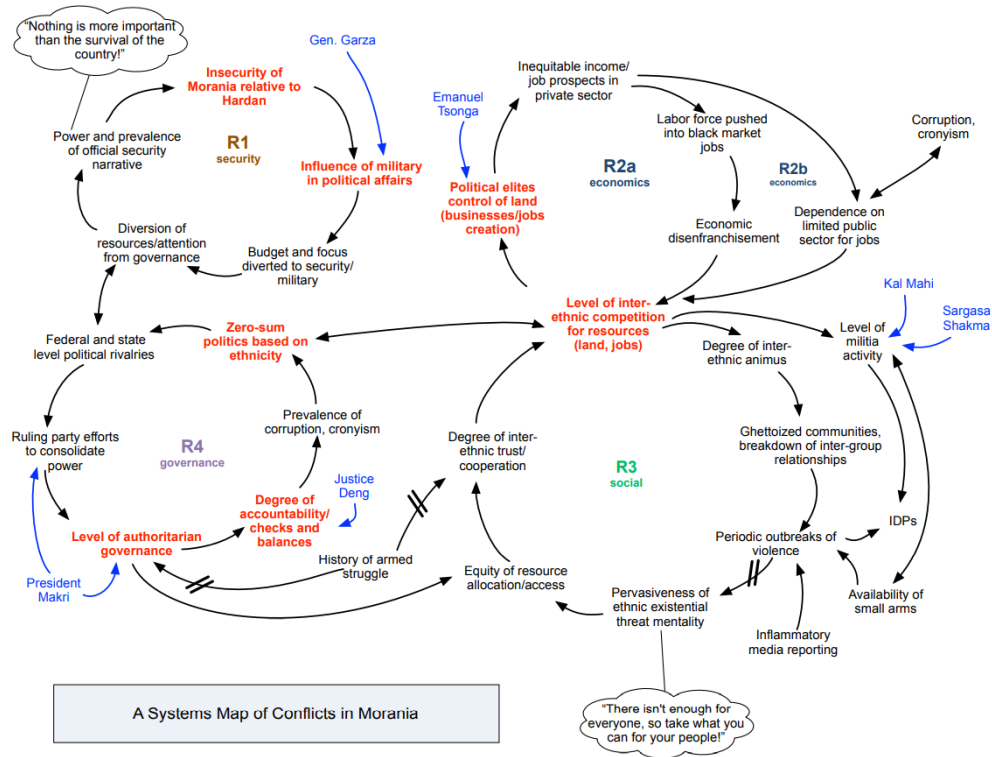
Figure 12 A Systems Map of Conflict in fictional country Morania.

Source: (CDA, Designing Strategic Initiatives to Impact Conflict Systems: Systems Approaches to Peacebuilding. A Rersource Manual, 2016)

They propose a 9-step process to product a systems map based on conflict analysis regarding the situation at hand:

1. Identify factors and actors for both conflict and peace: identify the factors that support conflict, support peace, and the key actors; their behavior, motivations, interests, and constituencies of influence.

2. Refining the analysis by identifying key driving factors of the conflict: by asking some questions based on step 1, like:

    a. Would this conflict be significantly different if x thing could be improved?

    b.   Would this conflict cease to exist if y elements weren't existing?

    c.   Would this conflict end if z was implemented?

3. Identifying key actors: asking the question; which of these actors can say "yes or no" to peace or conflict right now as the situation currently exists.

4. Use the cause-and-effect chart to identify causal relationships among key driving factors for conflict and other conflict forces in play.

5. Begin to develop causal loops among the key drivers for conflict. Include key actors for conflict who influence the system.

6. Use the System Archetypes to get unstuck, generate discussion, or do partial analysis of a system:

    a.   If stuck, start the mapping process.

    b.   Shortcut analysis if time isn't available or

    c.   Generate ideas for the map.

7. Put causal loops for the key driving factors of conflict together.

8. Identify key driving factors for peace. Add causal loops or indicate system inputs based on key driving factors for peace as well as key actors for peace.

9. Refine the analysis and seek validation.

After the above steps have been followed, now is time to address the points of leverage in the systems map.

Success to the Successful in Morania
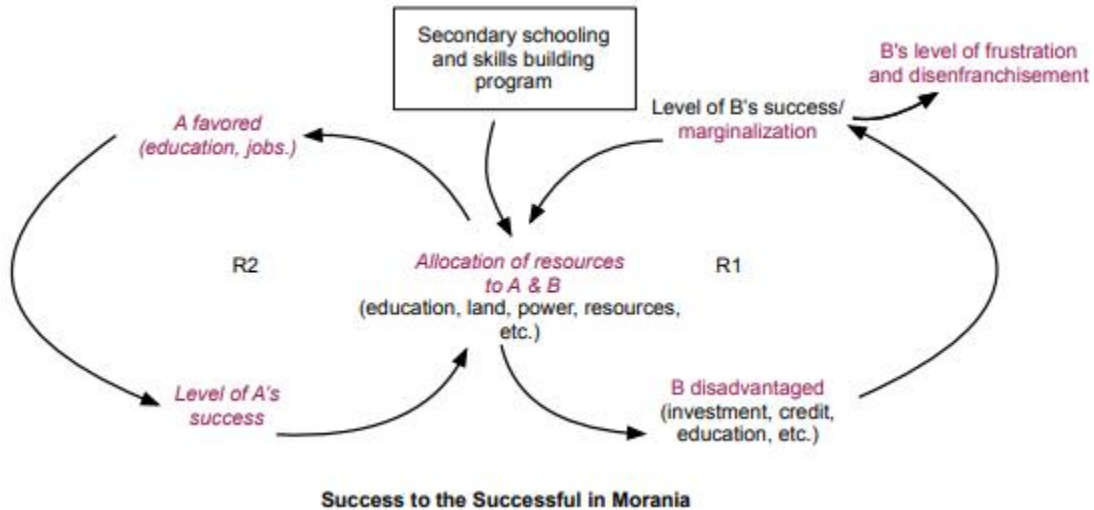
Figure 13 Success to the Successful in Morania

Source: (CDA, Designing Strategic Initiatives to Impact Conflict Systems: Systems Approaches to Peacebuilding. A Rersource Manual, 2016)

By mapping out the system and creating causal loops on the key driving factors of conflict, CDA was able to identify the areas of opportunity (point of leverage) and the bottlenecks that prevent the system from generating positive change to the stakeholders. The above method is called system dynamics in the system sciences literature, which will be furtherly discussed in the next chapters.

CDA finally quotes that the advantages of using systems thinking tools such as systems mapping to analyze conflicts, you can actually map the program's theories of change. A theory of change is the explanation of why and how an action is planned to achieve its objectives.

3.4.2 Gallo's conflict theory, complexity, and systems approach

One quick search to the Systems Research and Behavioral Science journal with the keyword "conflict", and Giorgio Gallo's paper will appear, the most cited in the journal related to the subject of conflict.

The key takeaway from this paper is that conflicts are complex systems that defy linear thinking, which is often used in their analyses. Gallo supports that systemic approaches for conflict modelling can aid the decision-making process before finalizing the strategies of intervention to the conflict situation. He showcased the importance of the role of systems thinking in conflicts also by addressing that models are learning tools, which may effectively help in taking decisions about conflict and in operating to prevent the onset of violence or to reduce it when the conflict has already started.

The researcher tries to contrast the effects of linear thinking with two different cases: the 2003 Iraq war and the operation "Peace for Galilee" (Israel invasion of Lebanon in 1982), where:

- The invasion of Iraq by US and British forces in 2003 resulted in a quick overthrow of Saddam Hussein's regime and was hailed as a significant military achievement by some analysts. However, others like Kenneth N. Waltz argued that it was not a remarkable feat, considering the vast difference in military and economic power between the US and Iraq. The aftermath of the invasion has been marked by a long period of insurgency and violence, resulting in significant military and civilian casualties, which continued even after the withdrawal of US troops in 2011.

- In 1982, Israel launched a full-scale invasion of Lebanon with the aim of destroying the military infrastructure of the Palestinian Liberation Organization (PLO) and undermining

its political influence on the West Bank Palestinians. The war resulted in heavy losses on

both sides, and although the PLO was dislodged from Beirut, it reorganized in Tunis and

continued to be a threat. Additionally, the invasion led to the birth of a new adversary, the

nationalistic Islamist movement Hizballah, which eventually pushed Israel out of

Lebanon and remained a threat, leading to a war in 2006. Israel's shortcomings in

counterterrorism operations are analyzed in depth by Daniel Byman (Byman, 2011),

including a failure to recognize the long-term political repercussions of counterterrorism

tactics.

The results of these initiatives were characterized as typical examples of linear and mechanistic

thinking (Gallo, 2012). The peace for Galilee case is an example of poorly chosen boundaries,

which did not consider the complexity of the conflict. The concept of boundaries in systems

thinking is important because systems are social constructs, defined by humans. Based on Gallo,

boundaries have different dimensions such as physical (e.g., land, resources, etc.), temporal (how

far do we have to go back to the conflict?), symbolic, and ethical. The choice of boundaries can

have a deep impact on how a conflict is understood and resolved.

The Minorities at Risk project studies ethnic and religious minority groups around the world and

has developed a theoretical framework for understanding the causes of ethnopolitical conflicts. A

system dynamics model (Figure 14) based on this work describes the main dynamics of an ethnic

conflict and distinguishes between activity variables (e.g., rebellion) and state variables (e.g.,

salience of ethnic identity). The ABC triangle conflict paradigm (Figure 3) is also discussed,

with attitudes being analogous to state variables and behaviors to activity variables. The two

paradigms are complementary and can be used together to analyze conflicts.
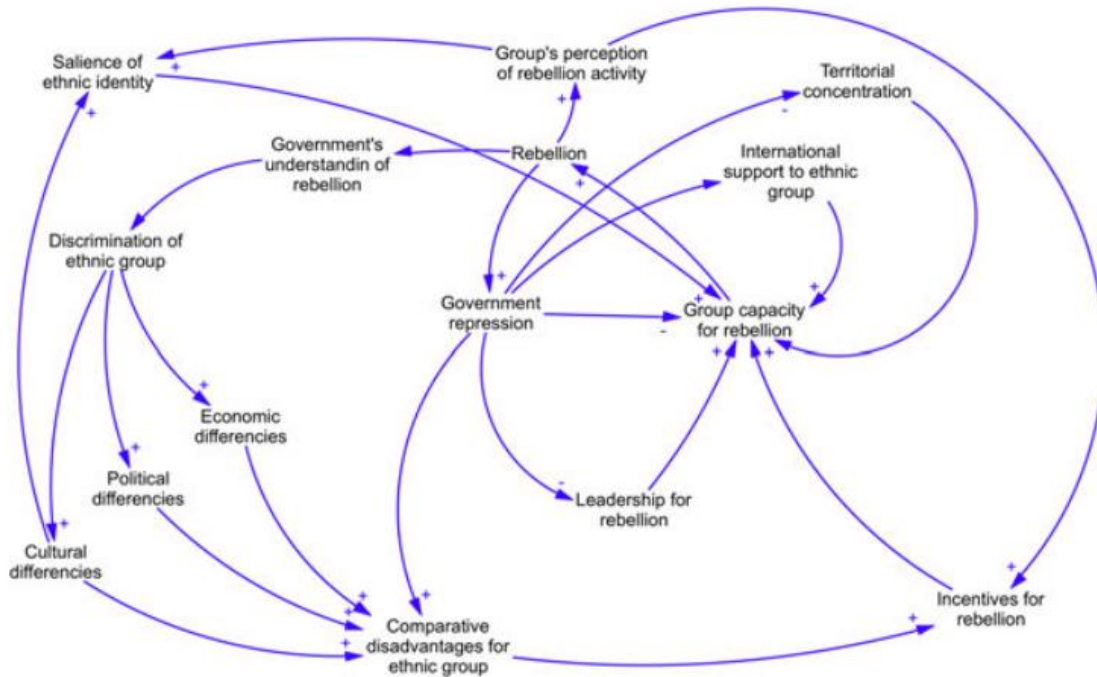
Figure 14 The dynamics of ethnoterrorism

Source: (Ackam & Asal, 2005)

The paper also discusses how causal loops and feedbacks, which are common in complex systems, make it difficult to resolve conflicts. The example of the repression-rebellion cycle is given, where government repression can lead to an increase in rebellion, which can then lead to more repression. Different models are discussed, including one focused on the role of intelligence in counterinsurgency operations and another on the effectiveness of protection and supply control in peasant areas. The article also mentions self-reinforcing cycles in repression policies studied in the context of the Israeli-Palestinian conflict.

The complexity of conflicts arises from various and sometimes unrelated elements. Conflicts are not limited to fixed parties, as parties involved can change or split, which can result in new parties. The ever-changing nature of conflicts, the elusiveness of quantification, and the personal

involvement of those who seek to analyze or intervene in conflicts are some of the challenges of modeling conflicts. The evolution over time of a conflict is unpredictable, and the stochastic nature of human behavior means that even if some statistical regularities are found, predictability remains elusive. The problems of quantification have been discussed in the system dynamics community, and although quantification remains crucial in system dynamics, qualitative models may also be effective in analyzing and understanding complex problems and developing robust strategies for dealing with them. Conflicts are often unpredictable, and their dynamics are always changing, so there is a need for caution when using models to analyze conflicts. Finally, the Israeli-Palestinian conflict serves as an example of how conflict dynamics can change, and new models must be developed to fit the current situation.

In conclusion, this paper argues that conflicts are complex and defy linear thinking, especially in today's world where conflicts are often intrastate and state power is losing ground to other powers. The paper suggests that systems thinking and modelling can be effective tools in conflict analysis and decision-making. The paper discusses the concept of emergent properties of a system and how it applies to conflicts, as well as the conditions that make a system unstable and collapse. The paper also proposes an extension to the Internal Pressure model based on the 2011 North Africa uprisings. Discussing the challenges of conflict modelling, we may find that there may be "archetypes" better suited for capturing the peculiarities of conflicts.

3.4.3 Systemic Conflict Transformation: Reflections on the Conflict and Peace Process in Sri Lanka

This paper discusses the key elements of the Sri Lankan conflict, including the parties involved, the issues at the core of the conflict, the historical dimensions of the conflict, the structural and

contextual factors that contributed to the conflict, and the parties' interpretations of the conflict. The main conflicting parties are the government of Sri Lanka, the Liberation Tigers of Tamil Eelam (LTTE), and all other political parties and movements who have been defined as stakeholders in the conflict. The key conflict issues are the recognition of the Tamils (and the Muslims) as ethnonational communities in their own right and their access to state power and territory. The conflict is marked by ethnopolitical identities, and the historical dimensions of the conflict stem from the colonial history of disempowerment, of Christian missionary campaigns, and a plantation-driven political economy. The emergence and escalation of the conflict were shaped by numerous overlapping processes, including development failures, majoritarian politics, and structures of governance, exclusion of non-Sinhalese communities from participating in state institutions, and mob violence. Parties have different positions and interests on all aspects, and the interpretations of the conflict vary.

Two of the most widely used tools for identifying parties and stakeholders were implemented: a) Listing the primary, secondary and tertiary parties (figure 10). The categorization of parties as primary, secondary and tertiary reflects how close various actors are to the conflict and how they are affected by its transformation (Ropers, 2008).

Table 1: Actors within the Three Conflict (Sub-)Systems in Sri Lanka			
	Primary Parties[7]	Secondary Parties	Tertiary Parties
Military Conflict	• GoSL, Sri Lanka Armed Forces • LTTE Military • Karuna Faction • Paramilitary forces	• Affected populations • Media • Intelligence agencies from India, Pakistan and USA • Diaspora organisations • Arms-dealing countries and organisations • States providing military training	• Sri Lanka Monitoring Mission (SLMM) • India • UN • INGOs • Individual eminent person/s • Diplomatic community • Strategic analysis institutions
Ethno-political Conflict	• GoSL • LTTE • All political parties	• Affected populations • Media • Front organisations of all political parties • Diaspora organisations • Business community & external investors • Religious organisations • Civil society organisations	• Norway as facilitator • Co-Chairs • India (GoI) & Tamil Nadu • UN • International financial institutions • Diplomatic and donor community • INGOs • Individual eminent person/s
Ethno-societal Conflict	• All ethnic groups in Sri Lanka; Sinhala, Tamil, Muslims, Indian-origin Tamils, Burgers, others	• Educational institutions • Law enforcement institutions • Media • Cultural organisations • Religious organisations • Civil society organisations • Diaspora organisations	• Teachers • Clergy • Journalists • Intermediary organisations • Community-based organisations/ discussion groups • Women's groups

Figure 15 Actors within the Three Conflict (Sub)-Systems in Sri Lanka

Source: (Ropers, 2008)

b) This method (Figure 15) differentiates the parties' manifestations with respect to interests, values, facts, relationships, and needs. The advantages of issue-centered tools are that they help to clarify the essence of conflicts and can support the parties in reaching a common understanding of where exactly the differences (as well as commonalities) lie. They encourage

the recognition and mutual understanding of different perceptions and can facilitate the

exploration of deeper-rooted manifestations of needs and fears (Ropers, 2008).

Table 2: Perspectives of Main Parties on Governance Issues in Sri Lanka		
Issues	**Sinhalese "Mainstream" Conflict Parties**	**Tamil "Mainstream" Conflict Parties**
Interest based	Competition over limited resources; land, natural resources (oil, deep sea minerals, harbours), education, employment, trade/economy, foreign aid	
Value-based	• Sovereignty • Territorial integrity	• Autonomy • "Homeland" • Self-determination
"Fact-based"	• Original settlers • Descendants of Vijaya • Only Theravada Buddhist country, thus custodian of Theravada Buddhism • Whole island was united under Sinhala kings • East part of Kandyan Kingdom	• Original settlers • Descendants of Mohenjadaro and Harappa civilisation of India • Independent kingdoms in North and East
Relation-ship-based	• "Tamils are a majority in the Indian subcontinent." • "Giving Tamils a part of Sri Lanka will never satisfy them, they will look for ways in which they could get the whole country." • "Sinhalese will have nowhere to go."	• "Sinhalese are the dominant numerical majority." • "Sinhalese will always discriminate against Tamils." • "Tamils can't expect the Sinhalese to understand Tamil grievances." • "Sinhalese cannot be trusted to devolve power."
Needs-based	• Language: Sinhala predominant • Religion: Buddhism given supremacy • Identity: Sinhala Buddhist, pure identity, retain identity supremacy, promote and protect Buddhism, security, ability to reach potential.	• Language: Tamil to be used in predominant Tamil areas. • Religion: Hinduism • Identity: Tamil Hindu, pure identity, self-determination, is a part of the decision-making process, have equal rights, security, cultural freedom, and ability to reach potential.

Figure 16 Perspectives of Main Parties on Governance Issues in Sri Lanka

Sources: (Ropers, 2008)

According to Ropers, the added value of the systems dynamics analysis (Figure 17) was the detailed contextualization and visualization of linkages between the key drivers of the conflict. The researchers were able to acknowledge the balances between the relationships of the impact factors and make interventions accordingly to "balance" the positive and negative feedback identified (causal interactions).


Figure 17 Conflict in Sri Lanka: A Systems Perspective

Source: (Ropers, 2008)

The aim of the article was to identify the potential added value of systems thinking to the transformation of protracted conflicts, based on the project for capacity building and dialogue promotion in Sri Lanka. According to the author, the basic findings were summarized in five points:

1) The goal of systems thinking application to conflicts, is to create an acceptance across all stakeholders, of the phenomenon that all conflict analyses are mental models based on the observers' perception of reality. For this to be achieved, emphasis should be gravitated towards the understanding the interdependences of the system and the acceptance of different perspectives by the involved parties.

2) As long as the acceptance of different narratives and perspectives exists, systemic approaches gain value in the conflict analysis, with two most prominent tools being systems dynamics for the analysis of the situation and systemic tools that can produce solution to the problems identified from the analysis.

3) Systems dynamics can help the practitioners and researchers proactively understand the impact of actions made to the system before their implementation, due to the causal interactions that can be mapped out by the methodology.

4) The basic assumptions of systemic thinking state that complex social changes, such as peace processes, are rarely linear and will face setbacks and resistances. Any constructive peace support must consider all forces with interests in the peace efforts, including those who are not like-minded. Ignoring opposing forces can provoke an upgraded campaign to undermine the credibility of peace activists.

5) Systemic thinking in peacebuilding involves creating a "learning space" that involves multiparticle, constructive-critical engagement, and envisioning multiple peaceful futures among conflicting parties and other stakeholders. These parameters serve as guiding principles in long-term processes where conflict transformation is seen as a fundamental system transformation.

Applied systemic thinking in psychotherapy and organizational development suggests that mobilizing internal resources within a system is the best way to solve problems. However, questions remain on how to do this in protracted conflicts. Systemic thinking comprises multiple theoretical and meta-theoretical approaches, and an open question is whether these can be reconciled. Another crucial variable is the extent to which systemic approaches assume that change can be initiated and controlled, so further research is needed on systemic tools for conflict analysis, exploring the utility of the concept of archetypes of fragile peace processes, and conceptualizing peace processes as learning processes. The aim is not to reinvent the wheel but to assemble existing wheels in the most useful way to promote conflict transformation (Ropers, 2008).

3.5 System dynamics limitations and weaknesses

In 1968, the Club of Rome was founded by a group of influential individuals who believed that the problems facing mankind were beyond the scope of traditional institutions and individual policies. The Club commissioned an international team of researchers to produce a model that described the behavior of the different but interrelated components that make up "the global system." The team employed the global model and system dynamics approach set out by Jay Forrester in his book World Dynamics and produced a report known as The Limits to Growth. The report concluded that if present growth trends continue unchanged, the limits to growth on this planet will be reached within the next one hundred years, leading to a sudden and uncontrollable decline in both population and industrial capacity. This was the birth stone of systems dynamics, an approach to visualize complexity in order to understand a system's behavior. Although the publication of Limits to Growth captured the attention of large

organizations, scholars, etc., soon the catastrophic outcomes of the "standard run" were demystified because it was identified that "social" factors were not considered due to their complexity, thus leading the uproar of the simulations to an end. Besides the cognitive "dissonance", that the "mathematization" of complex systems was proved to be impossible, the systems sciences community and especially the system dynamics community which is till today the third largest, after systems engineering and complexity-science, is still considered from many people a forerunner of systems thinking. System dynamics is currently the most applied out of all the system approaches in various fields including conflict, energy, defense, etc.

As referenced in the above cases of systemic approaches implementation to conflicts, the system dynamics methodology was present everywhere, quoted as a tool that can provide an overview of the causal interactions of the conflict system, the type of feedback (i.e., positive and negative). There is something fundamentally concerning, about using System Dynamics in these so coercive and complex problem situations like conflicts, due to the modelling method of SD. System Dynamics requires three groups: the modelling group, the problem owner, and the affected system (Vriens & Achterbergh, 2006). Since the divided groups include sub-groups inside them most of the times, communication and coordination issues may arise due to different values, agendas - making the situation more pluralistic and thus more difficult to define the problem space and possible solutions unitarily (find consensus).

If the case was that interacting feedback loops can determine system behavior and then be modelled on a computer, then SD can provide a basis for problem-solving in complex systems, but how are these feedback loops being decided, and most importantly how can we design solutions to address unwanted behaviors in a system, who decides what is right? This question is fundamental, because it pinpoints the importance of mental models, because the modelling group

can have different mental models about a problem, then the problem owner can have a different one, and the affected system can have multiple mental models itself about what the problem is. Chaos theory like previously mentioned can help us understand that small changes to the initial conditions of the system can lead to unpredictable behavior, and although a system's unpredictability falls to an attractor basin, that cannot simply be predicted by causal effects and feedback loops.

System dynamics models appear to be deterministic in nature, as they allow for one solution or path from a particular starting point (Jackson, Critical System Thinking and the Management of Complexity, 2019), and an objective view of a complex system simply falls to the consensus of the agents that observe the system, and then the observers that observe the observing system (second-order cybernetics). In coercive problem situations like conflicts, SD modelers can privilege the perspectives of those with more power and authority, leaving no space of opinion for the groups that are oppressed, and most probably are in the unwanted end of the situation. System dynamics serve the purposes of the élites even more effectively when they present themselves as "élite technicians", using their expertise to provide decision-makers with objective and neutral advice (Jackson, Critical System Thinking and the Management of Complexity, 2019).

Even in the outcome of the structured models shown previously (Figure 12, Figure 14, Figure 17) were the analysts used a System Dynamics methodology to capture the conflict system at hand, it can be observed that there are glimpse of reductionism. Simple feedback diagrams, that provide a basic conclusion/understanding of the relationships between parts are shown, but these diagrams provide a straightforward view of the relations, ignoring cultural, political, ethical, and coercive factors. More importantly, it leads the solution area limited of just making interventions

to balance out undesired reinforcing effects, so the problem is basically defined with linearly and can be solved with only one approach. For social systems like conflicts, causal and system dynamics models could be useful if the phenomena were predictable, stable and not subject to change.

To conclude this chapter, system dynamics can be a useful systemic approach when dealing with problems that exhibit cause-effect relationships, don't include many agents and relationships that makes it impossible to show their interactions and predict their outcomes. These kinds of problems can be characterized as complicated, where cause and effect relationships can be identified although they may be separated in time and space, thus making them harder to be fully understood. The other dimension of system dynamics is about the agents' mental models, and based on which reality and consensus they model the system's behavior. Plurality and multiple "truths" can't exist in such a deterministic method, since there is only one truth – the objective truth, diversity of perspectives can't be supported by systems dynamics. The result is that systems dynamics is considered for complicated-unitary problem situations, where its application can bring value. Conflicts, which are usually complex-coercive problems, can't be approached by a deterministic-functionalist framework. Somebody equipped with a critical systems sensibility, on the other hand, will have SD as an important methodology in their systems toolkit but will judge how helpful it is according to the traction it brings to problem resolving in a particular set of circumstances (Jackson, Critical System Thinking and the Management of Complexity, 2019).

3.6 System of systems methodologies (SOSM)

An important framework in the systems and complexity literature is that of Jackson's SOSM, that outlines in a grid form (Table 4), the type of system and the relations of the stakeholders, to determine which systems approach is more appropriate for the problem situation at hand. The framework is transparent regarding the assumptions underlying its own construction and it's both comprehensive and refined enough to encompass 10 systems methodologies (Jackson, Critical System Thinking and the Management of Complexity, 2019).

Table 4 Jackson's grid of problem contexts

		Stakeholders		
		Unitary	**Pluralist**	**Coercive**
Systems	**Complex**	Complex-unitary	Complex-pluralist	Complex-coercive
	Complicated	Complicated-unitary	Complicated-pluralist	Complicated-coercive
	Simple	Simple-unitary	Simple-pluralist	Simple-coercive

Source: (Jackson, Critical System Thinking and the Management of Complexity, 2019)

In this section, an explanation of the Systems-Stakeholders types will be provided and where conflict may be positioned.

For the Systems dimension:

- Complex: The whole is far more the sum of its parts, meaning that these systems have highly unpredictable behavior, and there are not deterministic approaches in dealing with them. They are rich in the number of agents and interrelations.

- Complicated: Cause and effect relationships can be identified but due to their separated time and space and linkages, it's difficult to fully understand them.

- Simple: Linear causality and effect relationships, easily identifiable and predictable.

For the Stakeholders dimension, it represents the increasing complexity from the divergence of values and/or interests amongst the people that are affect as well as can be affected by the system:

- Unitary: Have similar values, beliefs, and interests. Share a common goal and have a clear understanding of the agreed objectives.

- Pluralist: Have the same interests but different values and beliefs. There is need for space and time to align on the goal and objectives, because the differences may even lead to disagreements, negotiation, or even conflict. If all parties have been included in the decision-making process, then it's highly probable that they will come to an agreement.

- Coercive: Have few interests in common or even none. Usually, these types of stakeholders have very opposite beliefs and values, that compromising isn't feasible, and the objectives are not agreed on. Decisions mostly are made from those with the most power and influence.

Since the meaning of the grid's dimension has been explained, now it's time for the outline of the systems methodologies in it. Reading from bottom to top and from left to the right:

- SA: Systems Analysis

- SE: Systems Engineering

- OR: Operational Research

- VM: Vanguard Method

- SD: System Dynamics

- STS: Socio-Technical Systems Thinking

-   VSM: Viable System Model

-   SAST: Strategic Assumption Surfacing and Testing

-   SSM: Soft Systems Methodology

-   IP: Interactive Planning

-   TS: Team Syntegrity

-   CSH: Critical Systems Heuristics

-   LST: Liberating System Theory
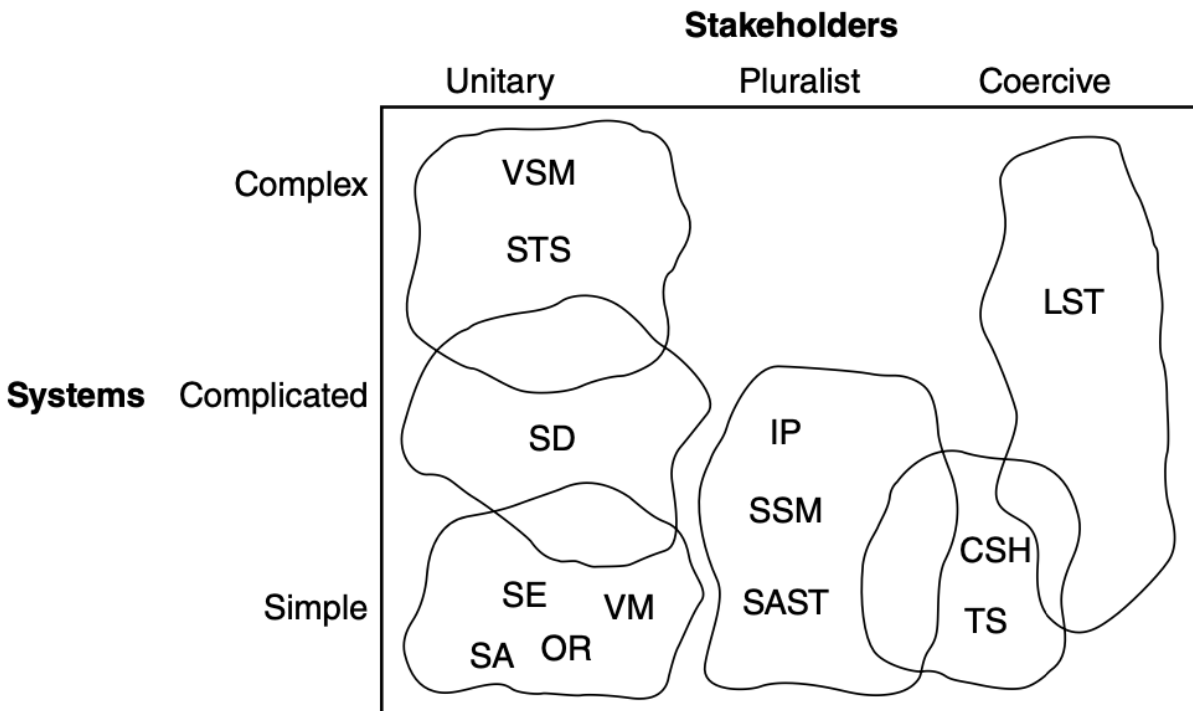
Figure 18 Methodologies positioning on the SOSM.

Source: (Jackson, Critical System Thinking and the Management of Complexity, 2019)

As mentioned earlier, conflict is termed as a competitive or opposing action of incompatible;

antagonistic state or action (as of divergent ideas, interests, or persons), but this term is general

and doesn't indicate clearly where conflict falls in the SOSM matrix. In unitary stakeholders,

people are inline in terms of goals, values, beliefs, and interests so conflict is probably unlike to occur and if it does, the common values and interests can act as a mitigation mechanism. In pluralist stakeholders, where people have different interests but common values and beliefs, conflict may arise and be trickier to handle, because it depends in the importance of the interests of each stakeholder, and how much they contradict with each other's goals, still common values and beliefs can be the enabler of a communication platform where the stakeholders can try to reach an agreement either by compromising, redefining the conflict system to find a win-win situation for all. In coercive situations where stakeholders have very few common interests or none, and their values and beliefs are opposite, conflict is very different from the aforementioned types because it's either difficult or impossible to find common ground of the disputes. Power plays an important role, because if the conflict is asymmetric, then one of the parties may be more powerful and impose its position to weaker stakeholders. The weaker stakeholders in order to restore balance to the system or try to defend their rights and interests, will probably resort to unconventional tactics that are difficult for the stronger party to counter. In addition, these conflicts often involve complex political, social, and economic factors, which can complicate efforts to find a peaceful or aligned solution. Options are limited, and the possibility that the powerful party will compromise its position in sacrifice of its interests is highly unlikely. Making interventions to coercive problems often requires a comprehensive and collaborative approach that involves all stakeholders. This may include the use of diplomatic efforts, negotiation, and the application of force or coercion in certain cases. It also requires a deep understanding of the underlying causes of the problem, as well as a willingness to address them through political, economic, and social means.

Regarding the other axis of the matrix, conflicts arise from human interactions, which usually cannot be predicted in terms of outcome, because the sum of the parts isn't equal to the whole (systems theory and complexity). Even in instances where there are relationships of cause and effect, conflict is probably created from different understandings, perspectives, or limited knowledge of how the problem should be approached.

Wars, domestic violence, civil unrest just to name a few, are conflicts that usually fall in the spectrum of coercive-complex or chaotic situations due to their unpredictability and use of power/force to oppress others. Those kinds of problems are often called "wicked" or "ill-defined" due to their untamed nature. These problems are difficult to define because often, the plural perspectives and different values of the observers for the situation, can't conclude to an objective definition, so there are no correct/wrong "solutions" or definitive answers. The next section will elaborate on why conflict is one of those types of problems, and how problem-solvers are dealing with them.

4 Conflicts as design problems

Humanity has managed to provide houses for almost everyone, connect cities with bridges that would otherwise could not be accessible by foot, provide warm water to bath, etc. Those accomplishments are significant for the course of human history but seem standard to most humans of the 21st century. The mechanistic approaches to such issues, were successful to provide solutions to human needs, but what about problems such as the climate crisis, COVID-19 pandemic, inflation to economies, the Russo-Ukrainian war. Those problems that come up all the time in the headlines of newspapers, podcasts, news broadcasts, etc., do not seem to have definite answers on how they should be approached.

The key message of this section is to provide solid arguments to prove why conflicts are design problems; because conflicts are wicked problems (1), and design problems are indeterminate and wicked (2).

(1) Conflicts are wicked problems. This argument will be supported by (Rittel & Webber, 1973) the famous paper's "Dilemmas in a General Theory of Planning", 10 characteristics in wicked problems but with a relation to conflict contexts:

1. *There is no definitive formulation of a wicked problem:*
   Unlike "tame" problems which have a definitive set of rules, goals, and solutions i.e., a game of chess, an exhaustive formulation can be stated which contains all the information needed for understanding and solving the problem.
   Wicked problems are different, because the information needed to understand the problem depends upon the problem solver's idea for solving it. In order to provide

solutions to a wicked problem, one must understand the problem in depth but as stated before, the understanding of the problem depends on the solver's perception.

For example, the city's council is having some budgeting meetings to decide on how they will spend their available income. One of the key objectives in the agenda is to decrease the yearly CO_2 emissions. Group A suggests that X amount of budget should be spent upon upgrading the city's pavements so pedestrians can be encouraged to walk more, create cycling sidewalks on every major street of the city so that civilians use bicycles instead of cars, and increase the public transportation's itineraries frequency so more people can be transported together instead of individually by polluting means i.e., cars and motorcycles. Group B on the other hand, suggests that X amount of budget should be focused more on economic growth. They suggested using carbon capture technologies and transitioning to natural gas as a temporary solution until clearer technologies could be developed. In this way, they support that people could continue to live as of now meaning that they can use the same means of transportation, and at the same time enable a more economic-growth focused approach to attract more investors, thus increasing return on investment. Naturally, a fierce debate took place due to the conflicting ideas, values, and interests on how the objective of reducing CO_2 emissions should be approached. The result was that no decision was taken from that meeting after 4 hours of debating, and the city's council cited it as an unconstructive and time-consuming procedure that didn't produce any results. The city's council committee is now considering that if a repetition of this meeting with the same participants should occur or if they should take a final decision on their own that could raise complaints from the left-out stakeholders.

The above situation is an example of how a clear goal of reducing CO_2 emissions that seems straightforward at first sight, allowed the emergence of conflict between the stakeholders. One of the reasons is that the goal's nature is wicked. Both groups provided solid arguments that indeed can achieve the goal within the budgeting limits, but a unitary strategy could not be produced. Each side has a different understanding of the problem, group A supports that the main driver of emissions is the commuting activity of the people, while group B supports that the low-investment in carbon-neutral technologies is what allows the number of emissions in the first place.

It seems that the meeting for goal formulation took a turn into an argumentative process where each side has a different image of the problem and of the solution that should be implemented to tackle emissions. Through discussion and debate, gradually the stakeholders can gain a more holistic understanding of the problem and capture the essence. This "systemic" approach is opposite to the operational way of solving problems; understand the problem, gather information, analyze information, synthesize information, and then create a solution. Debate, argumentative processes, and dialogue when are taking place in a constructive matter, can result into a greater understanding of the problem, clearer goals, and added value for the stakeholders.

2. *Wicked problems have no stopping rule:*

   Solving a chess problem or fixing a car, the goal is well formulated because criteria exist that indicate when the solution has been found. Wicked problems are not like that, because the process of "solving" a wicked problem is identical to understanding its nature, as they don't possess criteria for sufficient understanding and indication when

they are "solved". They are like living organisms or "open" systems (open to energy, information and organization), requiring continuing maintenance and resources to reach the stakeholders' desirable state, where they are allowed to say "that's enough" or "this is as far as we can go" or if they like the solution's outcome. Time, money, patience, and severity are some of the key factors that a problem solver must consider when dealing with wicked problems, because the resources are not infinite.

The correlation of this characteristic with the previous city's council conflict example is two-fold, because the first identified problem is the definition and goal formulation to reduce emissions and second emerged through the meeting from the stakeholders' differing opinions on how to approach the objective. The decision maker now is not only responsible to create a strategy to solve the problem (for a problem that has not been defined clearly) and as well try to resolve the conflict between the two groups of the city's council to achieve alignment to prevent future inter-organizational issues. The resources as mentioned above are not infinite, so the decision maker is required to make quick decisions to prevent escalation.

3. *Solutions to wicked problems are not true-or-false, but good-or-bad:*

   Unlike a math equation where the solution is either true or false, neither group of the city's council approaches were true of false. Both can reduce emissions on paper, but neither is true or false, or does cancel one another. In conflict situations, the parties that have more power and influence usually can dictate the outcome of the problem-solving process and impose their agenda upon the system. When parties are equally equipped, have a right to express opinions and suggest solutions to a problem, the picture of the

problem situation is becoming clearer. The direct and indirect affected stakeholders of the problem should be identified and allowed to participate in the picture-building process.

4. *There is no immediate and no ultimate test of a solution to a wicked problem:*
   For problems like a chess winning strategy, approaches have been tested and evaluated based on how successful they are, so a repository of tested solutions exists. With wicked problems, any intervention to the system will generate effects that could lead to consequences and undesirable outcomes. The prevention of interventions could have been better then, but this is not the case every time. Full consequences prediction to wicked problems is impossible due to the complexity and unpredictability of the system, but if the problem solver is cautious and has a rich understanding of the problem, then they are better equipped to not generate waves of undesirable effects.
   The city's council groups probably respectively suggested solutions to the objective before even going through a solid problem definition and identification of the key drivers of the problem. There is high likelihood that the suggested solutions themselves were a product from a different cities or country's "best practices" that can be implemented to the same context.

5. *Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial-and-error, every attempt counts significantly:*
   In laboratory experiments, chess, video games, etc., it's trial-end-error friendly context because the consequences in most cases are not fatal or severe. With wicked problems however, every intervention is consequential and cannot be undone once implemented. In

relation to the city's council, let's assume that on of the suggested approaches was implemented. The strategy and project plan would be decided on and then the implementation of the project would begin, with several stakeholders, workers, contractors, and executives consuming resources to achieve the goal. Once done, then the roll-out to the municipality begins and people can start feeling the change in their everyday lives (maybe not as quick). Then the gradual evaluation of the solution could start, to measure the success of the implementation, but what if the results were not as imagined? What if the results did reduce emissions but created a negative effect to another sub-system? Can the consequences that have been made be erased? If yes, what would it take? This is just a hypothetical scenario and set of questions, but they are not that far from the truth, that reinforces the point that interventions to wicked problems are truly an one-shot operation.

6. *Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan*

There is no measurable way to indicate if all solutions to a wicked problem have been identified. It is possible that no solution is found at all due to poor understanding of the problem.

Chess has a finite set of rules and scenarios that can occur even though the number is big. To bring the city's council conflict situation as an example, the decision makers have proposed different set of solutions to reduce CO_2 emissions, they support that could solve the problem. On paper as previously discussed, both proposals reduce emissions but due

to the budget, resources, and conflict constraints, Group's A cannot occur at the same time as Group B's solution. Even if those technicalities would be eliminated, still the problem is not well defined, so not only the objective's goals have not been set, also the variety of possible solutions has not been discovered yet. There are many approaches to solve a wicked problem, but not every solution is possible to happen at the same time, because there may be dependances between the solutions' nature, that could even eliminate or cancel one another.

7. *Every wicked problem is essentially unique*

Context, stakeholders, constraints, etc., are key factors of a problem's nature and the differentiators. Even though some problems of the same context, stakeholders, and/or constraints may present similarities, it's the decision maker's responsibility to deep dive into the problem at hand to discover its unique elements. Handling complex problems with an "isomorphic" mindset (similarity or structural resemblance between different problem situations).

To correlate this sentence with the city's council situation, it was mentioned previously that it's highly likely that the solutions suggested by the different groups were implemented at a different city or country, where the results were characterized as "successful", and those practices became "best practices to reduce emissions". The decision makers hypothesize that these solutions could be successful for their context without at first deep diving into the problem. Differences in culture, context, history, etc., may outweigh the similarities, so the solutions could be unsuccessful.

8. *Every wicked problem can be considered to be a symptom of another problem*

   Problems are defined as discrepancies between the current state and the desired state. The process of resolving a problem involves identifying the cause of the discrepancy and addressing it. However, each problem can be seen as a symptom of a higher-level problem, and settling a problem at a higher level is generally more challenging but more effective.

   The difficulty with incremental approaches to problem-solving. Incrementalism advocates for small steps to improve the overall situation. However, if the problem is addressed at too low a level, it may lead to unintended negative consequences and make it harder to tackle higher-level problems. Marginal improvements do not guarantee overall improvement.

   For example, the stakeholders of the city's council perceive the problem of emissions at a different level and perspective. Group A suggests that the driver of high emissions is the human transportation behavior and means of transportation, that's why the put so much emphasis on solutions that could change those patterns. On the other hand, group B believes that the low investment in carbon capture technologies and transition to clearer energy sources is what's causing the high emissions, because they accept that radical changes to the transportation system can decrease the growth rate and they believe that this is not attractive to potential investors. Those approaches are very different, but both seem realistic on paper, but are those really the only symptoms of the emissions problem? Another cause could be that the industrial activities e.g., factories, facilities, etc., are the reason that the city is facing problems with emissions in the first place, or the rapid increase of construction that led to deforestation, land degradation, and ecosystem

destruction, so that more people can live in the city. The list can still go on, but the important takeaway is that decision makers have to deal with problems at a high level, because the symptoms are the most probable to be observed first but resolving them, doesn't necessarily lead to a successful solution overall for the wicked problem.

9. *The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution*

"CO_2 emissions reduction" as stated previously can be caused due to the transportation system of the city, low investment in carbon capturing technologies, lackluster use of clear energy sources, deforestation, industrial activity, etc. Each of these offers a direction for the high emissions, but which one is right? As discussed before, there is no rule or procedure to determine whether a suggestion is correct. The reason is that when dealing with wicked problems there are many more ways of refuting a hypothesis than there are in the traditional sciences.

In dealing with wicked problems, the reasoning plethora is larger than that of the traditional sciences, chess games, etc., due to the uniqueness of the problem (point 7) and the lacking opportunity for robust experimentation (point 5), so a hypothesis cannot be put to crucial test.

The choice of explanation for a wicked problem is based on personal attitudes rather than strict logic. People tend to select explanations that seem most believable and relatable to them. It could be said that people choose the explanation that aligns with their intentions

and the possible actions they can take. The analyst's perspective or "world view" plays a significant role in explaining and resolving complex problems.

10. *The planner has no right to be wrong*

In the field of social planning and dealing with complex problems, there is no room for being wrong without consequences. Unlike in scientific endeavors, where hypotheses are offered for refutation and scientists are not blamed for being proven wrong, planners are held accountable for the outcomes of their actions. Their goal is not necessarily to find the ultimate truth, but rather to improve certain aspects of the world people live in. The problems planners face are often difficult to define and understand, making them inherently challenging. Planners working with open systems are tangled in complex webs of causality, and their proposed solutions are further complicated by the diverse and conflicting values held by different segments of the public. These challenges create a set of dilemmas that planners must navigate.

In the conflict scenario, the city's council is the planner tasked with making a decision on how to reduce CO_2 emissions. Point 10 implies that they cannot afford to make uninformed or hasty decisions, as the stakes are high and the outcomes will have tangible effects on the city and its residents. The city's council members are accountable to the citizens they represent. They have a duty to carefully consider the available information, expert opinions, and stakeholder perspectives before making a decision. Being "wrong" in this context would mean making a decision that does not adequately address the problem, ignores important factors, or fails to consider the long-term implications. The decisions made by the city's council will have tangible consequences for the city and its

residents. In the case of this conflict scenario, choosing one approach over the other will shape the city's infrastructure, transportation systems, environmental impact, and economic prospects. Making an ill-informed decision could result in wasted resources, missed opportunities, or unintended negative consequences.

The importance of thorough research, evaluation, and consultation should be emphasized. The city's council must gather relevant data, consult experts, and consider various perspectives and potential outcomes. They should strive to make an informed decision based on the best available information and analysis. It is essential for the city's council to ensure an inclusive and transparent decision-making process. They should provide opportunities for stakeholders to express their views, engage in constructive dialogue, and consider alternative solutions. By involving a diverse range of perspectives, they can mitigate the risk of overlooking important considerations and increase the likelihood of making a well-rounded decision. While wicked problems may not allow for trial-and-error learning, it is crucial for decision-makers to continuously monitor and evaluate the outcomes of their chosen approach. By assessing the effectiveness of implemented measures and adapting strategies as needed, they can learn from the experience and improve future decision-making processes.

The responsibility of the planner, in this case, the city's council, to approach the decision-making process with diligence, accountability, and a commitment to making well-informed choices. By recognizing the significance of their decisions and actively seeking to minimize the potential for error, the city's council can navigate the complexities of wicked problems and strive to make the most appropriate decision for their community.

(2) Design problems are indeterminate and wicked. This argument will be supported by

Buchanan's paper called "Wicked Problems in Design Thinking" (Buchanan, 1992).

1. *Design has no special subject matter of its own apart from what a designer conceives it to be*

   This argument suggests that design does not have a predefined subject matter like other disciplines such as biology, physics, or psychology. Instead, the subject matter of design is determined by the designer's perspective and conception of the problem at hand. Designers have the flexibility to define and redefine their subject matter based on the context and nature of the wicked problem they are addressing. This viewpoint acknowledges that design is a multifaceted discipline that can span across various domains and industries. It allows designers to bring their unique expertise, creativity, and problem-solving skills to different areas, adapting their approach as needed.

   In the city's council scenario, the conflict revolves around different conceptions of how to reduce CO_2 emissions in the city. Both Group A and Group B have their own ideas and perspectives on how to approach the problem. This highlights the idea that design, in this case, the design of solutions to reduce emissions, is not limited to a predefined subject matter. Instead, it is shaped by the different perspectives and conceptions of the problem held by the groups involved. Each group conceives design in its own way, proposing different strategies based on their understanding of the issue.

2. *The subject matter of design is potentially universal in scope*

Design thinking may be applicable to any area of human experience. But in the process of application, the designer must discover or invert a particular subject out of the problems and issues of specific circumstances:

This argument emphasizes that design thinking, as a problem-solving cognitive process, has the potential to be applied to any domain or aspect of human experience. Designers can tackle wicked problems in fields such as healthcare, education, transportation, sustainability, and more. However, in the process of applying design thinking, the designer must identify and understand the specific subject matter of the problem they are addressing. This involves immersing themselves in the specific circumstances, context, and nuances of the problem domain. By doing so, designers can gain deep insights into the complexities and interconnections of the wicked problem, enabling them to generate innovative and relevant solutions.

In this conflict, design thinking can be applied to address the objective of reducing CO_2 emissions. However, the specific subject matter that needs to be understood and inverted is the trade-off between investments in infrastructure and economic growth. Group A focuses on redesigning the city's infrastructure, promoting alternative modes of transportation, and enhancing public transportation. Group B, on the other hand, proposes investing in carbon capture technologies and transitioning to natural gas as a temporary solution. Design thinking, in this case, involves understanding the specific circumstances, interests, and values associated with each approach, and then generating innovative solutions that address the wicked problem of reducing emissions while considering economic growth.

In summary, Buchanan argues that design is not limited to a specific subject matter but is defined by the designer's perspective and conception. Furthermore, he suggests that design thinking can be universally applied, but in each application, the designer needs to uncover and comprehend the subject matter specific to the problem domain. These arguments emphasize the broad applicability of design thinking and the importance of understanding context in order to address wicked problems effectively.

In this section, an attempt to provide an explanation of why conflicts are in reality design problems was suggested that focused on two key arguments: (1) conflicts are wicked problems and (2) design problems are intermediate and wicked, referencing to some of the highest quality academic products that exist to date, while providing an imaginary conflict scenario, so the explanation for the reader is more digestible.

5 The role of critical systems practice and systemic design in conflict and conflict resolution

5.1 Critical systems practice

Critical systems practice (CSP) is a multimethodology that seeks to intervene in and improve complex real-world problem situations. It has four stages: 1) Creative, 2) Choice, 3) Implementation, 4) Reflection.

Critical systems practice is committed to "systems thinking", "critical awareness", "pluralism", and "improvement".

Commitment to "Systems Thinking":

> Critical systems practice like systems thinking, argues that the traditional scientific method which is based on reductionism, mechanistic thinking and objectivity is not applicable to complex systems. It promotes then importance of holism, interconnections, and emergence. It values the concept of pluralism of theoretical and methodological perspectives (Jackson, Critical systems practice 1: Explore-Starting a multimethodological intervention, 2020). Its transdisciplinary approach is a facilitator amongst different fields that come together to deal with complex problems.

Commitment to "Critical Awareness":

> Critical awareness is valued by critical systems practice as it agrees that it is impossible for any systems approach to fully understand the whole system. Regardless, with the aid of critical systems thinking directing the analysis to existing systems approaches,

methodologies and conducting a second-order critique by employing social theory. According to Luhmann (Luhmann, 2013), since social theories can have an impact on society, responsibility should be taken for the theoretical decisions made. Second-order analysis provides understanding the consequences of certain theories adoption. The designer has to be a critical thinker and analyze the available facts, evidence, observations, arguments, interrelationships, and what the system's behavior is, while at the same time being aware of the theoretical frameworks that should be applied based on the problem situation's nature. For example, when the designer is faced with a problem situation that the primary issues are of environmental nature, the designer has to be ecologically aware to ensure these issues do receive the necessary scrutiny. In reality, this could mean that the designer has to move away from the human-centric awareness and enlarge the scope to not-only human entities but all living things. Then, the decisions made for the problem will be shifted towards improving the situation for all living things instead for humans only. There is no one-theory for all due to the diverse nature of problem situations, thus the designer should have a knowledge toolbox of the different theories and be able to critically judge which theory fits to the problem at hand.

Commitment to "Pluralism":

Embracing pluralism meaning the use of a broad range of systems approaches and methodologies in a way that allows the strengths of each to flourish while the weaknesses are compensated, to intervene to problem situations. Multimethod increases flexibility and readiness against rapidly changing problems. Based on the SOSM (Figure 18) there were different methodologies for different problem situations based on two axes: the

systems (complex, complicated, simple) and the stakeholders (unitary, pluralist, coercive), if the problem situation's position is identified, then the appropriate methodology can be used, but what if the problem's issues are diverse? The designer then has to critically evaluate which methodology should be dominant based on the primary issues' nature, then if the other non-primary issues are different in nature, the designer can employ a different methodology based on the nature of the issue. Multimethodology requires understanding of the theoretical underpinnings of the different methodologies, for pluralism to be achieved. In the absence of methodological guidance, some implicit paradigm of analysis will come to dominate the intervention by default and the benefits of exploring what outcomes might be achieved using methodologies representing alternative paradigms will be lost (Jackson, Critical System Thinking and the Management of Complexity, 2019).

Based on Jackson (Jackson, Critical System Thinking and the Management of Complexity, 2019), a second requirement is needed, related to different paradigms. The designer has to seek to benefit from what each paradigm has to offer i.e., functionalism, conflict theory, etc. A paradigm represents a specific worldview, theoretical framework, or set of assumptions guiding research and practice. In the context of paradigm pluralism, paradigms are not seen as mutually exclusive, but rather as complementary and necessary to address complex problem situations. Integrating paradigms encourages the use of methodologies from different paradigms such as functionalism, interpretivism, radical change, etc. By integrating multiple paradigms, critical systems thinking aims to leverage the strengths and perspectives offered by each based on the problem's nature, enriching the understanding and analysis of the problem situation.

The final requirement of pluralism can be labeled as "reflexive and adaptive approach" to the use of the methodologies and paradigms. This means being self-conscious and aware of the underlying theories, assumptions, and rationales behind the chosen methodologies. It involves continuously reflecting on and critically evaluating the suitability and effectiveness of the methods employed. Pluralism encourages flexibility and openness to change, allowing for shifts in paradigm orientation if required. The goal is to ensure that the choice and application of methods are based on the understanding of the theoretical underpinnings, contextually appropriate to the problem's nature, and responsive to the evolving needs and dynamics of the problem-solving process.

Commitment to "Improvement":

The final commitment of CSP, is to bring improvement that embraces efficiency, efficacy, effectiveness, viability, sustainability, mutual understanding, empowerment, and emancipation. Although the need for a powerful strand of systems thinking designed to highlight and do something about emancipatory concerns, remains open (Jackson, Critical System Thinking and the Management of Complexity, 2019). First, there is need to ensure that interventions which address matters of efficiency and viability, should be critiqued from the perspective of all the affected stakeholders, because if an intervention threatens the best interests of the disadvantaged stakeholders, should be abandoned. Second, guarantee that the needs of the disadvantaged stakeholders are always displayed up-front, ensure that they are allowed to express their opinions, and they are given equal weight to the decision-making process. From an emancipatory perspective, improvements in the position of these stakeholders should be weighed just as much as the any other

benefits that will be created from the intervention. Third, because there will be scenarios where emancipation is the main goal of the intervention, emancipatory systems thinking will be dominant.

In "Systems Approaches to Management" by Jackson (Jackson, Systems Approaches to Management, 2000), he mentions that there two types of emancipation: 1) Emancipation through discursive rationality, 2) Emancipation as liberation.

1) Emancipation through discursive rationality which is originally derived from Marx's writings and led by Habermas, focuses on communication free from domination. Habermas associated it with the "ideal speech" situation where stakeholders are free to determine their true interests unaffected by distorted communication. In this situation, it is the better argument that dominates, and the ideology forced by the powerful.

   Beer's Team Syntegrity (TS) and Ulrich's Critical Systems Heuristics (CSH) complement the above suggestion. On the one hand, TS is supposed to promote open, non-hierarchical, participative decision-making, and on the other hand, CSH connects to Habermas' thought while emphasizing practicality though boundary judgement (the process of determining what is considered relevant or irrelevant in propositions, i.e., the inclusion and exclusion of areas based on ecological significance and stakeholder considerations in an environmental conservation project) and critique. He argues that the above provide an access point to the implications of systems design and boundary critique provides a method where all stakeholders, including those who are affected but not involved in the decision-making process, can use to reveal the partiality of the boundary judgements.

2) Emancipation as liberation focuses on the critique of existing social systems and propose alternative arrangements that liberate specific groups or interests from oppressive structures. The inspiration for this approach comes from the later work of Karl Marx's book "Capital" (Marx, 1996). He outlines how the capitalist mode of production leads to class struggle between the capitalist class who owns the means of production and the working class whose labor profits is extracted from. He points out that this struggle will eventually lead to an overthrow of capitalism and the establishment of a communist society. Other groups who face discrimination have been identified by sociologists based on factors such as gender, race, sexual orientation, disability, etc. Another critique that is one of the most challenging wicked problems of today's world is the climate change, which leads to the need to highlight sustainable communities that respect ecological principles, understand the world has finite resources, and our current pace of consumption is heading us towards a climatic catastrophe.

To justify the theories and use them within the broader context of critical systems practice, Jackson (Jackson, Critical System Thinking and the Management of Complexity, 2019) proposes the following approaches:

- Communicating the appropriate theory to oppressed groups to help them recognize the structures of domination and motivate them to become politically engaged in changing the system. This approach allows the oppressed to engage in democratic dialogue with those who understand the causes of oppression.

- The interpretive systemology (Fuenmayor, Truth and openess: an epistemology for interpretive systemology, 1991) (Fuenmayor & Lopez-Garay, The scene for

interpretive systemology, 1991), starts with the introduction of different interpretations of the context by particular individuals so that debate can be encouraged about the different in interpretations positions and rationales. This will eventually lead to a state of enriched consciousness amongst the participants. According to Jackson (Jackson, Systems Approaches to Management, 2000), despite the phenomenological foundations of interpretive systemology, a Marxist perspective (focus on the relationship between social classes and the unequal distribution of resources and power) will become accepted as the one that best explains "the facts" and action will follow based on that basis.

- Another approach is supported by Bhaskar's critical realism, who believes that social science can reveal structural mechanisms that give rise to false interpretations of social reality. By identifying these mechanisms, individuals are morally compelled to take action to remove them and achieve universalized freedom for all.

These approaches aim to justify Liberating Systems Theory (LST) by raising awareness, challenging false consciousness, and empowering oppressed groups to effect change. LST focuses on coercion derived from complex structural mechanisms in society that sustain oppression.

Multimethodology

The process of using critical systems practice framework has phases that provide practical guidelines while remaining true to philosophy and theory of critical systems thinking, thus, in

this section an analysis will be provided for each phase. As mentioned earlier, the phases of CSP consist of 1) creativity, 2) choice, 3) implementation, 4) reflection.

1. In the creativity phase, the major issues in the problem situation are highlighted using various creativity-enhancing devices (e.g., brainstorming, the "nominal group technique", "rich pictures") (Jackson, Critical System Thinking and the Management of Complexity, 2019) and systems perspectives (SPs). The SPs provide a systemic appreciation of the problem situation and include perspectives such as machine perspective, organism perspective, cultural perspective, political perspective, the coercive system perspective, the environmental perspective, and the interrelationships perspective. These perspectives offer different lenses through which to view organizations and address different aspects such as efficiency, culture, power dynamics, and environmental sustainability.

Machine Perspective:
- Views organizations as rational instruments designed for effectiveness in achieving goals.
- Organizes parts in a hierarchical structure to ensure goal achievement.
- Emphasizes efficiency and efficacy in processes and control through rules.
- Focuses on information processing and evaluation based on efficiency.

Organism Perspective:
- Portrays organizations as complex systems seeking survival.

- Acknowledges the interdependence between the organization and its environment.

- Views organizations as open systems with autonomous subsystems.

- Requires finding a suitable environmental niche and responding to changes.

- Highlights the importance of coordination, viability, and adaptation to a turbulent environment.

Cultural Perspective:

- Considers familiar and persistent ways of seeing and acting in organizations.

- Recognizes human beings as crucial contributors to organizational success.

- Emphasizes the negotiation and renegotiation of different perceptions of reality.

- Highlights the role of leaders in creating a culture that inspires and fosters innovation.

- Evaluates the organization based on shared purpose, culture, and capacity for original thinking.

Political Perspective:

- Views organizations as coalitions of individuals and groups with diverse interests.

- Focuses on the politics and power dynamics within organizations.

- Examines conflict resolution and how different interests are reconciled.

- Evaluates the organization's ability to manage conflict and maintain control.

"Coercive System" Perspective:

- Considers organizations as instruments of domination and exploitation.

- Recognizes different social groups and their often-irreconcilable interests.

- Emphasizes the power dynamics within organizations and societal structures.

- Calls for the empowerment and emancipation of oppressed individuals and groups.

- Evaluates the organization in terms of social justice, equality, and liberation.

Environmental Perspective:

- Extends the organism perspective to include the natural environment.

- Acknowledges the interdependence between organizations and their environments.

- Considers the impact of organizations on the environment and the use of natural resources.

- Evaluates the organization based on sustainability and environmental consciousness.

Interrelationships Perspective:

- Recognizes the interconnectedness and interdependencies within systems.

- Highlights the need to identify important linkages and leverage points for improvement.

- Reminds practitioners to anticipate unintended consequences of interventions.

- Emphasizes the systems' view of connectivity and the dynamic nature of problem situations.

The creativity phase finishes when the issues identified through the system paradigms have been classified between "primary" and "secondary". The primary issues are those that are more critical and urgent, and they kind of define the problem. By identifying the primary issues' systems paradigm, the initial choice of methodologies can begin. The secondary issues are probably less urgent and don't affect the critical path of the intervention as much as primary ones, but they should be considered as well, because as the intervention is being formed, there may be a time when a new analysis is deemed crucial due to the importance of the secondary issues. Of course, the appropriate systems perspectives should be chosen again for the secondary issues, but the reward is that the analysis will consider all the crucial issues through the process.

2. The choice phase involves selecting the most suitable systems methodologies, methods, models, tools, and techniques to address the issues identified in the creativity phase. The choice of methodologies should be guided by critical

awareness and an understanding of their strengths and weaknesses in relation to the problem situation. Different methodologies may be applicable depending on the primary issues identified through the SPs. Jackson (Jackson, Critical System Thinking and the Management of Complexity, 2019) provides an example of how the different systems perspectives fit to specific methodologies: The machine perspective is usually associated with simple-unitary problems (mentioned earlier on the SOSM), so if the primary issues emerge from that aspect, then methodologies like Hard Systems Thinking (HST) and the Vanguard Method (VM) can deal with those kind of technical and process issues, so that's why the analysis should be kicked-off from this direction. Another example could be about problem situations that have to do with violent conflicts that create oppressive relationships between different religious groups in a country. Since the problem situation probably falls into the area of complex-coercive problems and the appropriate systems perspective that can reveal those issues is the "coercive system" perspective, then Liberating Systems Theory should be used as a starting point for the intervention. In (Table 5), a connection between the different paradigms and systems perspectives as well as the methodologies has been created for the reader's ease, where a deep dive is following onto the paradigms and their meaning. Jackson also supports that during this phase, it's acceptable to use methods that are not originated from systems thinking.

Table 5 Paradigm - Systems perspective (SP) matrix and the appropriate systems methodologies

Paradigm	Systems perspective	Methodology
Functionalist	Machine	• Hard systems thinking • Vanguard method

	Organism	• Socio-technical system thinking • Viable system model
Interpretive	Cultural	• Soft systems methodology
	Political	• Soft systems methodology
Radical change	Coercive system	• Team syntegrity • Critical systems heuristics • Liberating systems theory
Ecological awareness	Environmental	• Liberating systems theory (variants)
	Interrelationships	• System dynamics

Source: (Jackson, Critical System Thinking and the Management of Complexity, 2019)

- Functionalism is the doctrine that what makes something a thought, desire, pain (or any other type of mental state) depends not on its internal constitution, but solely on its function, or the role it plays, in the cognitive system of which it is a part. More precisely, functionalist theories take the identity of a mental state to be determined by its causal relations to sensory stimulations, other mental states, and behavior (Levin, 2023).

  For example, keys are artefacts that enable us to unlock doors. Most keys are made of brass but there are other ways to unlock doors e.g., touch ID, face ID, password, break it, etc., but all that matters to something's being a key, is that it is capable of unlocking a door.

  The functionalist logic is utilized to judge the intervention in terms of efficiency, efficacy, and the viability of the systems design (Jackson, Critical System Thinking and the Management of Complexity, 2019).

- Interpretivism supports that reality is subjective, multiple, and socially constructed. We can only understand someone's reality through their experience of that reality, which may be different from another person's shaped by the individuals' historical or social perspective. Interpretive approaches rely on questioning and observation to discover or generate a rich and deep understanding of the phenomenon being investigated.

  The priorities of the interpretive paradigm will consider whether there is improved effectiveness in the sense that longer term purposes are explored and desirable changes to achieve them are agreed and implemented (Jackson, Critical System Thinking and the Management of Complexity, 2019).

- Radical change based on (Burrel & Morgan, 1979) is divided into two categories: 1) radical humanist (subjective-radical change) and 2) radical structuralist (objective-radical change):

  1) Theorists in this paradigm are mainly concerned with releasing social constraints that limit human potential. They see the current dominant ideologies as separating people from their "true selves". They use this paradigm to justify desire for revolutionary change. It's largely anti-organization in scope.

  2) Based on this paradigm, theorists see inherent structural conflicts within society that generate constant change through political and economic crises. This has been the fundamental paradigm of Marx, Engles, and Lenin.

The radical change paradigm will evaluate whether the intervention has promoted empowerment and emancipation (Jackson, Critical System Thinking and the Management of Complexity, 2019).

- Ecological awareness will be brought to bear to consider the impact of the changes on the environment and future generations (Jackson, Critical System Thinking and the Management of Complexity, 2019).

3. In the implementation phase, the chosen primary and secondary systems methodologies, methods, are being put into action to address the issues that have been identified in the creativity phase. As a rule of thumb, if the critical systems practice process is employing more than methodology, the primary methodology in use, should match the primary issues of the system, so that there is theoretical backup. The designer through the whole process should be able to juggle between different methodologies if it's reasonable. For example, in the previous conflict scenario between the different religious groups, the "coercive system" system perspective reveals the primary issues of the problem situation, so Liberating System Theory should be the primary methodology, but as the intervention process is evolving, it was identified that a great amount of the conflict's nature was traced back to cultural differences. The designer then should be able to flexibly transition to another methodology that fits the SP i.e., Soft Systems Methodology methodologies. If the implementation is based on theoretical foundations, then the justification is simpler as well as the expected outcome will be closer to the desired state.

4. The reflection phase is to the evaluate the results of the intervention. The designer is responsible to provide the knowledge gained for the problem situation they dealt with in relation to the employed paradigms, methodologies, methods, models, tools, and techniques. Not only this evaluation will reinforce understanding of the designer's perspective about critical systems practice, but the produced materials could be provided as examples for action research literature.

To conclude this section, critical systems practice can be enhanced if the practitioners follow two important guidelines. First, they need to be flexible in terms of usage of different methodologies, methods, models, tools, and techniques. Second, the process should be iterative in all steps and the practitioners should have their eyes open for emerging issues, so that they can steer to the appropriate methodologies.

Methodologies

Based on Jackson (Jackson, Critical System Thinking and the Management of Complexity, 2019), there are seven constitutive rules for the critical systems practice methodology (CSP):

1. The CSP multimethodology is a structured way of thinking which understands and respects the uniqueness of a wide variety of sociological paradigms and draws upon them to improve real-world problem situations.

2. CSP makes use of creativity-enhancing devices to discover and classify the main issues posed by a problem situation, ensuring minimally that it is examined through the lenses of the seven systems perspectives (SPs).

3. CSP uses systems methodologies, sometimes in generic form, which can be clearly related back to the different paradigms, as the basis for its intervention strategy –

often employing the tactic of naming one methodology as primary and others as secondary, with the possibility of this relationship changing during the course of the intervention

4. The methodologies used in CSP will themselves employ, in combination, methods, models, tools, and techniques drawn from a variety of different sources, including "decomposed" methodologies.

5. The choice of systems methodologies, and of the methods, models, tools, and techniques used in a particular intervention, will rest upon an appreciation of their different strengths and weaknesses as revealed by "critical awareness," learning from previous action research, and on the experience of the participants.

6. Since CSP, and the systems methodologies it employs, can be used in different ways in different situations, each use should exhibit conscious thought about how to adapt it to the particular circumstances.

7. Each use of CSP should yield research findings based on an understanding of relevant current knowledge as well as provide an evaluation of the outcomes derived from the concerns of the different methodologies and paradigms.

Mike Jackson has also set constitutive rules for the different sociological paradigms (Jackson, Critical System Thinking and the Management of Complexity, 2019):

Main elements of a generic functionalist systems methodology:

The claim to have used a systems methodology according to the functionalist paradigm must be justified according to the following guidelines:

1. an assumption is made that the real-world is systemic.

2. analysis of the problem situation is conducted in systems terms.

3. models aiming to capture the nature of the situation are constructed, enabling us to gain knowledge of the real-world.

4. models are used to learn how best to improve the real-world and for the purposes of design.

5. quantitative analysis can be useful since systems obey laws.

6. the process of intervention is aimed at improving goal seeking and resilience.

7. intervention is best conducted on the basis of expert knowledge.

8. outcomes are tested primarily in terms of their efficiency, efficacy, and viability.

Main elements of a generic interpretive systems methodology:

The claim to have used a systems methodology according to the interpretive paradigm must be justified according to the following guidelines:

1. there is no assumption that the real-world is systemic.

2. analysis of the problem situation is designed to be creative and is not conducted in systems terms.

3. models are constructed that represent some possible "purposeful systems".

4. models are used to interrogate perceptions of the real-world and to structure debate about changes that are feasible and desirable.

5. quantitative analysis is unlikely to be useful except in a subordinate role.

6. the process of intervention is systemic, never-ending, and is aimed at generating learning and alleviating unease about the problem situation.

7. the intervention is best conducted on the basis of stakeholder participation.

8. outcomes are evaluated primarily in terms of effectiveness - on whether longer term purposes are explored and desirable changes to achieve them are agreed and implemented.

Main elements of a generic emancipatory systems methodology:

The claim to have used a systems methodology according to the emancipatory paradigm must be justified according to the following guidelines:

1. an assumption is made that the real-world has become systemic in a manner alienating to individuals and/or oppressive to particular social groups.

2. analysis of the problem situation is designed to discover who is disadvantaged by current systemic arrangements.

3. models are constructed that reveal the sources of alienation and oppression.

4. models are used to "enlighten" the alienated and oppressed about their situation and to suggest how they should act to improve it.

5. quantitative analysis may be useful especially to capture particular biases in existing systemic arrangements.

6. the process of intervention is systemic and is aimed at improving the problem situation for the alienated and/or oppressed.

7. the intervention is conducted in such a way that the alienated and/or oppressed begin to take responsibility for their own future.

8. outcomes designed to improve the position of the alienated and/or oppressed are evaluated primarily in terms of empowerment and emancipation.

In addition to its contributions to systems thinking, the utilization of systems methodologies within Critical Systems Practice (CSP) holds implications for conflict and conflict resolution. The emphasis on paradigm diversity acknowledges that conflicts often arise from divergent perspectives and competing interests rooted in different paradigms. By incorporating multiple paradigms, CSP recognizes the importance of understanding and addressing these conflicts within the context of system development.

Generic methodologies offer a framework for addressing conflicts by explicitly acknowledging the theoretical link back to paradigms. This allows for a more comprehensive understanding of the underlying assumptions and beliefs that give rise to conflicts. Through the application of paradigm-specific methodologies, CSP enables practitioners to translate these assumptions into practical interventions and test their impact on conflict resolution.

Moreover, the flexibility of generic methodologies in incorporating methods from different paradigms supports a multidimensional approach to conflict resolution. By seamlessly integrating diverse methods and techniques, CSP practitioners can draw from a wide range of conflict resolution approaches to address different aspects of conflicts. This facilitates a more holistic understanding of conflicts and provides a toolkit of strategies to navigate complex conflict situations.

Furthermore, the concept of emancipatory systems practice within CSP highlights the role of systems methodologies in critiquing power dynamics and promoting fairness. This critical lens enables the examination of institutional arrangements that contribute to conflict, inequality, etc.

By employing systems methods "obliquely" for emancipatory purposes, practitioners can leverage methodologies from different paradigms to challenge and transform power imbalances, leading to more sustainable and just conflict resolution outcomes.

The research and evaluation aspect of systems methodologies in CSP further contributes to conflict resolution. By assessing the effectiveness of various paradigms and methodologies in addressing conflicts, practitioners can refine their approaches and improve conflict resolution strategies. This iterative process allows for continuous learning and adaptation, ensuring that conflict resolution efforts align with evolving needs and contexts.

In conclusion, the use of systems methodologies within CSP not only promotes paradigm diversity and effective system development but also offers valuable insights and tools for conflict resolution. By acknowledging the link between paradigms and conflict, employing diverse methodologies, and embracing emancipatory perspectives, CSP contributes to a more comprehensive and inclusive approach to conflict resolution, ultimately fostering greater understanding, collaboration, and sustainable outcomes in complex conflict situations.

Methods

There is a method that can be leveraged in the creativity stage that originates from Checkland's Soft Systems Methodology (SSM) (Checkland & Scholes, 1990). Rich pictures (RPs) (*Figure 19*) are visual representations that try to capture the issues of a problem situation. It is a participative process that aims to visualize the participants' worldview of the problem.

There are several ways to combine RPs and systems paradigms (SPs). Participants can be asked to produce RPs without any reference to SPs initially. The RPs can then be examined to identify which SPs they focus on the most, and participants can be instructed to create enhanced versions

of the RPs that consider all the SPs. Another approach is to have participants create RPs that

depict the performance of the system, including cultural and political factors. This approach

helps participants quickly grasp the value of CSP and gradually introduces them to the more

challenging SPs.

Figure 19 Part of a rich picture of a telephone helpline situation

Source: (Rich pictures, n.d.)

Finally, Jackson (Jackson, Critical System Thinking and the Management of Complexity, 2019)

argues that The reflection phase of CSP, when it addresses whether improvements to the problem

situation have been made, acknowledges the concerns of a wide range of methodologies and paradigms. A reasonable starting point is to evaluate the success of an intervention on whether it has increased:

● Efficiency: Minimum use of resources to obtain the required outcomes; a concern of the functionalist paradigm and promoted by HST (Hard Systems Thinking).

● Efficacy: The means work to achieve the desired outcomes; a concern of the functionalist paradigm and promoted by VM (Vanguard Method).

● Awareness: Of interrelationships in the problem situation and the possible unintended consequences of action; a concern of the functionalist paradigm and promoted by SD (Systems Dynamics).

● Anti-fragility: The system can develop in relation to its turbulent environment and increase its capabilities while responding to change; a concern of the functionalist paradigm and promoted by STS (Socio-Technical System) and the VSM (Viable System Model).

● Effectiveness: The exploration of longer-term purposes and agreement on desirable changes to achieve them; a concern of the interpretive paradigm and promoted by soft systems methodologies such as SAST (Strategic Assumptions Surfacing and Testing), IP (Interactive Planning), and SSM (Soft Systems Methodology).

● Empowerment: All stakeholders are represented in decision-making; a concern of the radical change paradigm and promoted by TS (Team Syntegrity) and CSH (Critical Systems Heuristics)

● Emancipation: The position of disadvantaged stakeholders is enhanced; a concern of the radical change paradigm and promoted by LST (Liberating Systems Theory).

● Sustainability: The environment and future generations are taken into account; a concern of ecological awareness.

5.2 Systemic design

Systemic design offers promising potential for addressing complex, multi-system, and multi-stakeholder challenges in various domains. Unlike traditional human-centered design, which focuses on creating products and services to enhance value for customers and users, systemic design takes a holistic approach by integrating design, research, and method skills. It does not aim to create specific artifacts but instead employs tools such as systems maps (e.g., Gigamap and synthesis map) to facilitate learning, design, knowledge creation, and action.

The emergence of systemic design is driven by the need for better social systems and complex services, as well as the desire to lead systems change. It is a pragmatic practice that draws from various disciplines, including systems thinking, design thinking, sociology, cognitive engineering, and management theory. By integrating these diverse perspectives, systemic design aims to guide human-centered design in complex contexts.

Systems, in the context of systemic design, are viewed as highly interconnected social and technological assemblages that function as a whole. They are networks of interconnected functions working together to achieve a specific outcome and can be both emergent and designed. Understanding systems as nested or containing wholes, systemic design seeks to intervene in higher-order systems to effect change in desired contexts. Today, all systems can be

seen as social systems or systems of systems with social implications, including natural and ecological systems influenced by human intervention.

Systemic design extends the principles of human-centered design to complex, multi-stakeholder service systems. It leverages established design competencies such as form and process reasoning, social action, generative design research, design methods, and visual communication practices to describe, map, propose, and reconfigure complex social systems.

Systemic design has evolved through the integration of systems thinking theory and design thinking methodologies, supported by research, experimentation, and the development of new approaches. It is an interdisciplinary field that combines systems thinking and methods with human-centered design principles to address complex sociotechnical and multi-stakeholder systems. As a design discipline, systemic design draws upon theories and knowledge from systems and social sciences, cybernetics, applied research, organizational and management studies, ecology, media studies, and anthropology. Its application areas have expanded to strategic planning, urban design, healthcare, public policy, and digital innovation, establishing systemic design as a professional practice.

A system is defined as an assembly of interdependent parts that interact and give rise to emergent interactions and behaviors. Systems thinking aims to analyze how the parts are recognized and how they interact with each other. It seeks to understand the flows, relationships, and behaviors of system components to facilitate changes or improvements that lead to desired outcomes. The process of creating improvements inherently involves design.

Systems thinking does not come naturally to most individuals, as we are often trained to think linearly, analyze patterns using formulas, and perceive systematic sequences as simple cause-and-effect chains. We tend to approach situations as problems that require linear, step-by-step processes to be solved. This linear thinking leads us to mistake complexity for complicatedness, and we attempt to break down systems into individual components to investigate them separately. However, when these components are observed and reconnected within the system, the dynamics change precisely because they interact with each other. The weakness of the linear approach is that it hinders our understanding of the behavior of the whole system. Understanding the relationships between system levels (wholes containing other wholes) and orders of control is essential for comprehending a system.

Design thinking refers to the process of finding meaningful solutions for human, organizational, and societal challenges. In order to address these challenges effectively, designers engage in listening, learning, conceptualizing, and iterating solutions with stakeholders. The design process begins with a deep understanding of the needs, perspectives, and interests of the stakeholders. Design workshops are conducted with diverse participants, and the complexity of the challenge often determines the level of stakeholder engagement and co-creation of solutions. Stakeholders are considered experts in their lived system experience and are seen as leaders in shaping future models. In this process, the designer's role is to develop a shared understanding of the design context, reframe goals and challenges, visualize, and concretize solutions, and foster dialogue among stakeholders.

Systemic design has evolved from its initial focus on systems thinking for advanced design problems to encompass complex social systems and systems change. It has expanded rapidly as a field and is now being applied to address complex societal issues such as healthcare services, urban planning, energy transition, climate resilience, new economics, and public policy. These domains are not isolated but are influenced by various dynamics, including population demographics, climate effects, political influences, and technological impacts. Designers, while not experts in these domains, play a crucial role in sensemaking within complex systems.

Systemic design challenges are often socially organized, large-scale, and multi-organizational, with significant emergent properties. In high complexity, design and management decisions cannot rely solely on individual or in-group knowledge. Mixed teams with a diverse range of disciplines are often required. Systemic design employs sensemaking skills such as visual storytelling, visual analysis, dialogue facilitation, and diagramming to extract wisdom from stakeholders and translate knowledge effectively. It emphasizes the use of various methods suitable for emerging and complex contexts rather than relying solely on deep expertise in specific domains.

Innovation and meaning-making take different perspectives in market-facing domains compared to socially complex design domains. Innovation, defined as the process of creating meaningful value for people, manifests through differentiated qualities that reveal value in artifacts and services. Market-oriented tactics emphasize aesthetics, branded identity, and promoted features to highlight meaningful differences. Sensemaking becomes more important in the organizational and social realms, particularly when dealing with uncertainty and expanding stakeholder perspectives. Sensemaking involves collective efforts to form a coherent rationale for explaining shared concerns, which aligns with systems thinking.

While systems thinking can be challenging to learn and share, design practices focused on sensemaking are more accessible for eliciting ideas and engaging participation. Various schools of sensemaking exist, and they can all be valuable in systemic design. Design practices tailored for specific purposes enable groups to make sense of systems and navigate complexity.

The evolution of design methods and design thinking according to Jones (Jones P. , 2014) have been influenced by systems theory principles. Bousbaci (Bousbaci, 2008) identified three different generations of design methods that followed systems theory principles (Table 6). Three theoretical streams of design philosophy that have influenced design thinking: rational, pragmatic, and phenomenological. These philosophical influences have blended over time, shaping the characteristics of design thinking.

Table 6 Four generations of design methods

Generation	Decade	Orientation	Methods	Systems influences	Trends	Authors
First	1960s	Rational	Movement from craft to standardized methods	• Sciences • Systems engineering	• Design science • Planning	• Simon • Fuller
Second	1970s	Pragmatic	• Instrumentality • Methods customized to context	• Natural systems • Hard systems	• Wicked problems • Evolution	• Rittel • Jones
Third	1980s	Phenomenogical	• Design research and stakeholder methods • Design cognition	• System dynamics • Social systems • Soft systems	• User-centered design • Participatory design	• Archer • Norman
Fourth	2000s	Generative	Generative, empathic, and transdisciplinary	Complexity	• Generative design • Service design	• Dubberly • Sanders

Source: (Jones P. , 2014)

The four design domains (artefact design, product and service design, organizational and social innovation, and systemic design) require the evolution of design thinking, practice, research, and education to develop the necessary skills and knowledge for addressing complexity. Each

domain necessitates different sets of skills and methods, with transferability from lower to higher complexity levels but not vice versa. Systemic design (D4) is the most complex and unbounded domain, focusing on social transformation, policymaking, ecological and community design, and addressing complex social systems.

According to Jones and Van Ael (Jones & Van Ael, 2022), the four design domains embody design processes for the following contexts (Figure 20):

1. *Artefact design (D1 – Limited complexity):* Skilled practice for a wide range of communications, from artefact creation (graphic, ads, websites, 1-2 designers) to strategic communications as part of systems change.

2. *Product and service design (D2 – High artefact complexity):* Value creation by design and mixed teams (including service design, product innovation, multichannel, and user experience); design for integration across media.

3. *Organizational and social innovation (D3 – Complex, bounded by business or strategy):* Change-oriented, design for work practices, strategies, and organizational structures.

4. *Systemic design (D4 – Complex, unbounded):* Design for social transformation, complex social systems, policymaking, ecological and community design.
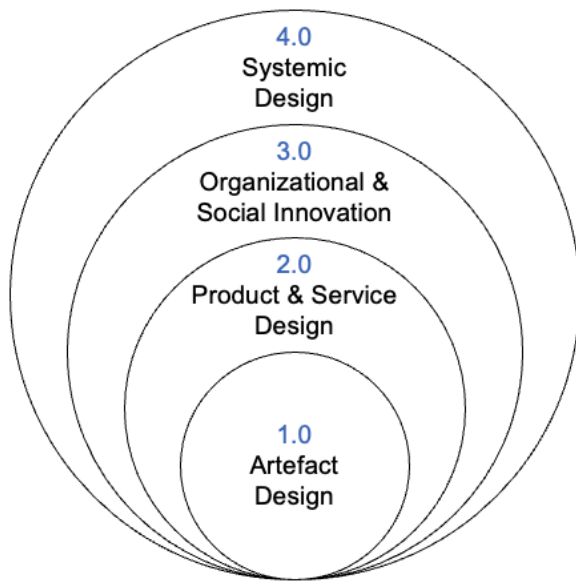
Figure 20 Boundaries of the four design domains

The Design Domains model, proposed by Jones, illustrates the expanding scope of design practice beyond products, services, and communications (Design 1.0-4.0). Design 1.0 (artefactual) and Design 2.0 (products and services) are well-known domains that focus on enhancing economic value and competitiveness through design quality, aesthetics, and usability. Design 3.0 (organizational processes) and Design 4.0 (social systems) represent complex, non-traditional domains that require different skill sets for transdisciplinary projects and mixed-stakeholder teams. In these domains, design is practiced as a sensemaking process involving system stakeholders, rather than solely focusing on the creation of artifacts or market value enhancement.

Nelson and Stolternman (Nelson & Stolterman, 2012) suggest that the basis for design as systems thinking by integrating of both systems sciences and the systems approach as reasoning

and thinking techniques for adapting design to complex whole system problems. Systems thinking and design thinking are both cognitive abilities/approaches that allow the practitioners to create interventions to a system that target their "leverage" points that will enable change to complex and systemic problems. Although the two approaches differ in some areas, Jones (Jones P. , 2014) and (Jones & Van Ael, 2022) suggest a core set of systemic design principles that are shared by both design and systems disciplines:

1. Idealization

2. Appreciating complexity

3. Purpose finding

4. Boundary framing

5. Requisite variety

6. Feedback coordination

7. System ordering

8. Leverage impact

9. Generative emergence

10. Continuous adaptation

11. Self-organizing

The eleven shared systemic design principles represent responses to challenges that are usually emerged during the problem-solving process. Jones (Jones P. , 2014) mapped where each systemic design principle falls into (Figure 21) Evenson's & Dubberly's (Evenson & Dubberly, 2010) suggested design model where each phase contributes to significant and necessary output towards deploying a systemic intervention. It is compound by five generic phases that follow a sequential timeline type of mapping: Strategy, Discover, Design, Develop, Deploy.

• Idealization	• Purpose finding	• Boundary framing	• Generative emergence	• Self-organization
• Appreciating complexity	• Requisite variety	• System ordering	• Continuous adaptation	• Feedback coordination
		• Feedback coordination	• Leverage impact	
		• Leverage impact		
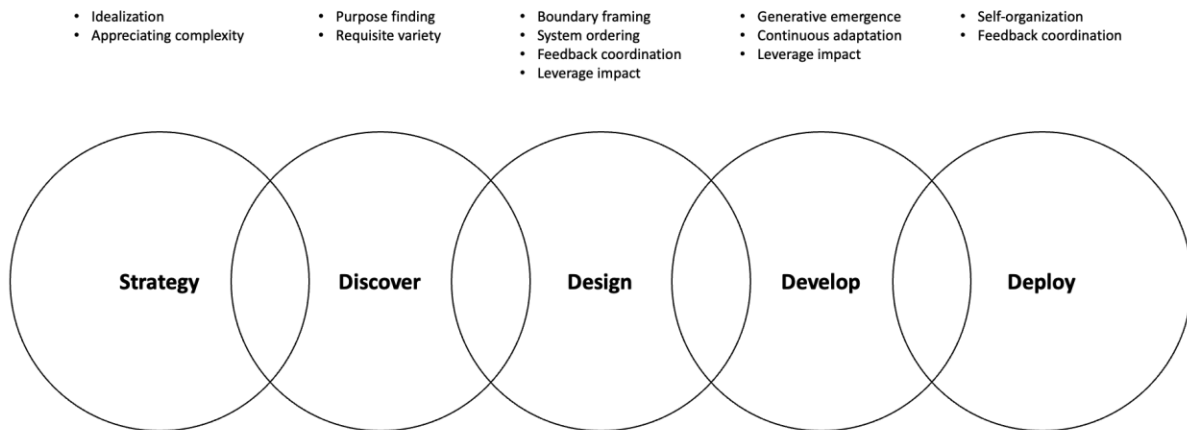
Figure 21 Design principles mapped to design model

An attempt to connect conflict and conflict resolution will be provided again with the definition

and implications of each systemic design principle that indicate the relationship between the

design and systems context will be provided:

1. Idealization

   Idealization is the principle of identifying an ideal state or the conditions that will be

   needed for the system to reach the desirable state that is set to. The principle of

   idealization helps the practitioners visualize a high-level idea of the future system that

   will be different from its current state. It acts as the starting point of the process to

   identify the necessary changes and actions to be designed.

   For a conflict system such as the previously mentioned examples (the city's council and

   the oppressive opposition party), the practitioners will have to understand the rationale of

   the conflicts, the primary and secondary issues of the system, so that they can visualize

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an ideal situation. That ideal situation of course cannot exclude all the stakeholders and especially the oppressed ones from the formulation of the vision. This process shouldn't be based on a functionalist or interpretive paradigm because power dynamics will always enable the more powerful stakeholders to steer the vision towards their interests.

2. Appreciating complexity

Acknowledges the dynamic complexity of multi-causal wicked problems and the cognitive factors involved in the understanding of the relationships that indicate problem complexity (Jones P. , 2014). As previously referenced to Rittel's and Weber's (Rittel & Webber, 1973) paper and Jackson's (Jackson, Critical System Thinking and the Management of Complexity, 2019) SOSM, identifying the problem at hand is as important as solving it. In practice that means that the identify of a problem is a frame reference towards the most theoretically and empirically based framework to intervene to the problem situation. Problem finding and and defining is based on the agent's perception of complexity, thus if the problem is recognized from the lens of both systems approach and design thinking, then the appreciation of complexity is established.
In summary, appreciating complexity is about understanding the intricate nature of wicked problems, which are complex and interconnected. It involves recognizing the cognitive factors involved in comprehending problem complexity and appreciating the indeterminate nature of design solutions. This principle also emphasizes the identification of wicked problems and the need to understand and address their multi-causal aspects. Conflict situations often involve multiple factors, perspectives, and underlying issues. Recognizing and appreciating this complexity is crucial for gaining a comprehensive

understanding of the conflict. By appreciating complexity, individuals involved in conflict resolution can go beyond surface-level disagreements and delve into the deeper causes and dynamics of the conflict. Conflicts can often be classified as wicked problems due to their intricate and evolving nature. Identifying conflicts as wicked problems highlights the challenges involved in finding simple and definitive solutions. It underscores the need for a flexible, holistic, and collaborative approach to conflict resolution.

The principle of appreciating complexity acknowledges the cognitive aspects of understanding complex problems. Similarly, in conflict resolution, understanding the cognitive factors such as perceptions, emotions, and biases that influence the parties involved is crucial. Recognizing and appreciating these cognitive factors can help mediators and facilitators navigate and address the complexities of the conflict effectively.

3. Purpose finding

The concept of purpose finding involves the exploration of the fundamental factors that shape a system and influence its outcomes. Purpose seeking or finding is a repetitive undertaking that involves validating ideas and propositions through collaborative discussions with relevant parties, employing a language that is constructed mutually and agreed upon for its significance. In both design and systems, the purpose is conveyed by its significant impacts and the actions it generates.

The concept of purpose finding and conflict resolution are related in the sense that both involve understanding the underlying drivers and motivations behind a situation. Conflict

often arises when there are different perspectives, interests, or goals among individuals or groups. In such cases, uncovering the purpose or underlying needs behind each party's position can help in finding common ground and reaching a resolution.

By engaging in purpose finding, individuals involved in a conflict can explore and clarify their respective objectives, expectations, and desired outcomes. This process allows for a deeper understanding of the underlying reasons for the conflict, and it provides an opportunity to identify potential areas of agreement.

In conflict resolution, purpose finding can be a valuable tool for facilitating communication, building empathy, and finding mutually acceptable solutions. By focusing on the core purposes and interests of all parties involved, conflict resolution efforts can aim to address the underlying needs and find compromises or win-win outcomes that satisfy multiple stakeholders.

Moreover, purpose finding also emphasizes the importance of effective communication and collaboration in conflict resolution. By constructively engaging with stakeholders, testing propositions, and seeking agreement on the relevance of different perspectives, purpose finding can contribute to creating an inclusive and collaborative environment conducive to resolving conflicts.

4. Boundary framing

The principle of determining the most effective fit between a concept and its target environment, considered as both concept framing and boundary critique. A boundary judgement determines the scope of a system of interest. Framing as design determines the

services and features included or excluded in a proposal, as well as perspectives, values, and stakeholders (Jones & Van Ael, 2022). Some of the key points in detail include:

- Problem Framing and Boundary Judgments: Problem framing and boundary judgments are considered common principles shared between systemics (the study of complex systems) and design. The objective of problem framing is to define the most effective fit between a concept and its target environment. This process involves selecting boundaries and considering the associated meanings and effects of those boundaries.

- Boundary Frames: Boundaries can vary significantly and may range from specific aspects like "individual behaviors" to broader perspectives like "national climate adaptation." Each boundary has different values, actions, and possible effects. Reframing a problem by adjusting the boundary can have the effect of engaging certain participants while excluding others.

- Boundary Reframing: Boundary reframing aims to energize social or financial investment toward a defined problem by setting a boundary that encompasses desired behaviors. By reframing a problem, such as changing the framing of climate change to "global warming," participants can be influenced or motivated for various expected benefits.

- Placement and Repositioning: Placement is a design technique that involves repositioning a concept, solution, or option in different contexts to discover new capacities for interaction or use. By placing an artifact or concept in a new setting, the purpose and function of the system can be reframed. This process of

repositioning can occur throughout the design process, from strategy to deployment.

- Design Thinking and Reframing: Design thinking involves finding alternative approaches to problem-solving by challenging the initial problem as given. Reframing, in this context, refers to the process of identifying new metaphors and better problems to resolve. It includes using metaphor and analogy, contextual engagement, and conjecture practices. Metaphors help represent the problem or its elements in a more familiar model. Contextual engagement involves evaluating the functions of the problem within different contexts, while conjecture asks "what if" questions to explore novel possibilities.

- Barriers to Reframing: Reframing can be hindered by three barriers: fixation, problem-solving mental models, and resistance to journey. Fixation refers to cognitive biases or attachment to previous ideas, inhibiting the exploration of new possibilities. The problem-solving mental model sees the problem as something to be solved through predefined methods, limiting creativity. Resistance to journey relates to the reluctance to explore imaginative paths and transformative possibilities due to a bias toward reasonableness.

Conflict often arises from differing perspectives, interests, or needs. How a problem is framed can significantly impact how the conflict is understood and addressed. By carefully framing the problem, considering various boundaries and meanings, conflicting parties can gain a better understanding of the underlying issues and identify potential solutions.

Boundaries play a crucial role in conflicts by defining the scope and context of the disagreement. Different boundary frames can lead to diverse interpretations of the conflict and potential solutions. By engaging in dialogue and exchanging perspectives, conflicting parties can explore different boundary frames to find common ground or identify mutually acceptable boundaries for resolution.

Reframing is a cognitive process that involves shifting perspectives and considering alternative viewpoints. In the context of conflict resolution, reframing can help parties challenge their assumptions, biases, and preconceived notions about the conflict. By reframing the problem or the way they perceive the conflict, individuals can generate new insights, empathy, and potential solutions that were previously unexplored.

Overcoming barriers to reframing, such as fixation, problem-solving mental models, and resistance to journey. These barriers can also be present in conflicts, inhibiting parties from finding common ground or exploring new possibilities. Recognizing and addressing these barriers can help facilitate conflict resolution by encouraging open-mindedness, flexibility, and a willingness to consider alternative perspectives.

5. Requisite variety

   The assessment of external variety that needs to be controlled by an observer, known as requisite variety in a system, determines the functions required to manage or accommodate that variety. Whether designing a social system or an information system, it is essential to align the functions of a proposed solution with the complex social and

functional factors of the target environment, ensuring an adequate range of options for interaction.

Conflict often arises from diverse perspectives, interests, values, and goals among individuals or groups. These differences represent variety within a social system. Requisite variety acknowledges that conflict can emerge when there is a lack of alignment or coordination among different elements of a system. Conflicting viewpoints and interests can create tension and discord.

Requisite variety suggests that to effectively address conflict, it is essential to incorporate diverse perspectives and stakeholder involvement. By including representatives from various functions, disciplines, and positions, the design process can better account for the variety of interests and viewpoints at play. This approach aims to ensure that the solutions and interventions developed address the complexity of the conflict.

Requisite variety involves managing and attenuating variety in a system. In the context of conflict resolution, this can mean finding ways to reduce or address the differences and tensions that contribute to the conflict. This may involve identifying common ground, exploring shared values or interests, and seeking compromise or consensus among stakeholders with diverse perspectives.

the importance of dialogue in addressing conflicts and making effective interventions.

6. Feedback coordination

The identification and regulation of feedback types and relationships (first-n order) in social and technological systems for coordinating the dynamic fit to environmental and contextual functions (Jones & Van Ael, 2022)

Feedback coordination refers to the process of incorporating feedback loops into a system or product design in order to guide its performance and achieve desired outcomes. According to Jones (Jones P. , 2014), there are three levels of feedback coordination:

- First order: System feedback coordination. This involves incorporating feedback loops directly into the system or product being designed. These feedback loops can be negative (compensatory) or positive (reinforcing) and are designed to monitor and control the system's output. For example, in a software application, prompts to add inputs to an incomplete data record or the detection and management of large data files are forms of first-order feedback.

- Second order: System management coordination. This level of feedback coordination involves feedback systems that adapt the system's performance to environmental demands. It includes activities such as user feedback, usability research, and product/system-level evaluation. The feedback received at this level may influence design decisions and help improve the system's functionality.

- Third order: Organizational management coordination. This level of feedback coordination focuses on feedback processes within the organization(s) responsible for coordinating the system design process. It involves observing the performance and values represented in system management and coordinating responses across the organization. For example, organizational feedback management may involve coordinating efforts to increase investment or end a product offering based on performance and market reports.

Feedback coordination helps address conflicts by providing mechanisms for gathering information, monitoring performance, and making necessary adjustments. It involves the

continuous exchange of feedback loops to ensure that the system's behavior aligns with desired goals and resolves conflicts that may arise.

7. System ordering

Systems ordering refers to the process of arranging and defining relationships between various elements within a system. Designers make choices to determine how objects, components, and abstract concepts relate to each other in a systematic way. By ordering the information and components of a system, designers create a compositional unity that allows for coherent patterns and information flows. The design of data structures and information representations plays a crucial role in enabling the recognition of meaningful relationships by observers. This applies not only to physical systems but also to organizational and policy systems, where the same principles of ordering and compositional unity are important.

Systems are described as manifestations of order, and they can be designed by defining relations, reframing boundaries, and changing hierarchies and roles. Ordering activities encompass a range of tasks, from defining data types to establishing system-level structures such as laws and agreements.

In complex systems where ordering is lacking or poorly designed, conflicts may arise. For example, if roles and responsibilities within an organization are unclear or if information flows are fragmented, it can lead to misunderstandings, power struggles, and conflicts among individuals or groups. Recognizing the importance of ordering and designing systems that promote clarity, coordination, and effective communication, potential sources of conflict can be addressed proactively and allow the organization to

run smoothly. The process of ordering can as well be utilized as a means to resolve conflicts. By redefining relationships, reframing boundaries, and changing hierarchies and roles, designers or mediators can create new structures that facilitate conflict resolution. Through thoughtful design, systems can be reconfigured to address the underlying causes of conflict and guide action towards the key drivers of the action because perception is reality to the observer.

8. Leverage impact

Refers to the concept of achieving significant and desired effects or outcomes by utilizing minimal resources or inputs. It is based on the idea of maximizing the results you can obtain from limited efforts.

In the context of systems and cybernetics, leverage is considered a fundamental principle. It involves identifying critical points or moments of intervention within a system where a small action or change can have a significant impact or influence. By strategically applying leverage at these key points, you can create substantial changes in the system as a whole.

However, when it comes to design, the concept of leverage is not as well-defined or established. Design is primarily concerned with effectiveness rather than efficiency. While efficiency focuses on optimizing resources and minimizing waste, effectiveness focuses on achieving desired outcomes or goals.

Design leverage can be understood in a few different aspects:

Anticipating future system outcomes: This refers to designing a system or platform that has the ability to adapt and become more useful as it grows or evolves. By considering

the potential future needs and changes, designers can create flexible and scalable

solutions that can leverage the system's growth to deliver better results over time.

Appropriate fit for achieving results: Design leverage also involves creating a design that

is well-suited for achieving specific results or addressing a particular use case. It means

identifying the most suitable design approach, features, or functionalities that can

effectively accomplish the desired goals.

Strategic leverage of targeted design features: This aspect focuses on the deliberate and

strategic use of specific design features to create a significant impact. By carefully

selecting and implementing design elements that have a high potential to influence the

desired outcomes, designers can leverage these features to enhance the overall

effectiveness of the design.

In summary, leverage impact in design is about achieving significant results with

minimal inputs. Design leverage encompasses anticipating future outcomes, ensuring the

appropriate fit for desired results, and strategically leveraging targeted design features.

Coercive conflict situations often involve power imbalances and a high degree of

intensity, where parties involved may be driven by their own interests and use force or

manipulation to achieve their goals. In such situations, leverage can be a valuable

approach to influence and resolve conflicts effectively.

Achieving maximal desired effects from minimal inputs: In coercive conflict situations,

leverage can involve identifying strategic actions or interventions that can produce

significant results with minimal resources or efforts. This could mean finding alternative

approaches or solutions that have a high impact on reducing conflict or changing the dynamics, even if the actual investment or involvement is relatively small.

Leverage at critical points of intervention: Understanding the critical points or moments of intervention within a conflict is crucial. Identifying the key factors or influences that perpetuate or escalate the conflict, parties can apply leverage at those critical points to bring about positive change. This could involve targeted communication, negotiation, or other interventions that address the underlying causes or triggers of the conflict.

Anticipating future outcomes and strategic leverage: Applying leverage in conflict resolution also entails considering the potential future outcomes and consequences of actions. Designing interventions that anticipate and address the underlying issues or interests driving the conflict, parties can strategically leverage their efforts to achieve sustainable and long-term resolution. This may involve designing agreements, processes, or systems that promote fairness, inclusivity, and mutual benefit, reducing the likelihood of future conflicts.

Emancipation and effectiveness over efficiency: In conflict resolution, emancipation and effectiveness take precedence over efficiency. While efficiency focuses on quickly resolving the conflict with minimal resources, effectiveness focuses on achieving a resolution that is acceptable and satisfactory to all parties involved and emancipation focuses on empowering marginalized voices, addressing power dynamics, and encouraging self-determination for individuals and groups. Designing effective and emancipating conflict resolution strategies requires considering the unique dynamics and needs of the situation, as well as applying leverage in a way that maximizes positive outcomes and minimizes negative consequences.

9. Generative emergence

Emergence refers to the phenomenon where a higher level of organization and new properties arise from the interactions of components within a complex system. These emergent behaviors are considered novel or distinct from the individual properties of the system's parts. In the context of complex social systems, emergence is often accompanied by intentional and purposeful behaviors.

The concept of emergence is closely related to complexity theory and the observation or simulation of natural processes, known as biomimicry. While emergence can involve unintended purposes, a distinguishing characteristic is that emergent capabilities can only be achieved through the interactions and organization of the system's components with the environment.

An entity's design involves assembling components in a way that enables the entity to fulfill a function or purpose that the individual components alone cannot achieve. This implies that the arrangement of components gives rise to new properties that are not inherent to the components themselves.

In systemic design, two protocols of emergence are identified by Nelson and Stolterman (Nelson & Stolterman, 2012): compositional emergence and created emergence. Compositional emergence results from the ordering or construction of artificial micro-systems to adapt artifacts to environments. It involves designing relationships, categories, ideal types, and structures for organization. Created emergence, on the other hand, arises from organizing systems that include physical connections, designed forms, organizing processes, and the synergies that emerge from them.

Compositional emergence is influenced by pre-existing social or use contexts, which shape and direct innovations. These formative contexts are akin to the installed base that a new system aims to reconfigure. New forms and structures must adapt to existing environments, market conditions, and norms of organizations and social systems. The generative emergence resulting from connecting new practices to formative contexts may take time to recognize due to systemic delays in feedback and resolution of connections. To study and design for emergence, social research protocols should measure emerging behaviors against the ongoing actions and meaning of the context in which they occur. It is important to explore the environment during interactive phases to observe the effects of relationship perturbations and adjust accordingly to achieve anticipated outcomes. Emergence and its principles can also be related to conflict and conflict resolution. In conflict situations, emergence can occur as a result of interactions among the involved parties and their respective perspectives, goals, and behaviors.

Conflicts often involve complex social systems where emergent behaviors and properties can arise. These emergent behaviors may be seen as novel or distinct from the individual actions and intentions of the conflicting parties. Conflicts can lead to the emergence of new dynamics, power structures, communication patterns, and strategies that were not present before.

Understanding emergence in conflicts is essential for effective conflict resolution. It requires recognizing that the resolution cannot be solely based on addressing the individual components or issues but must also consider the emergent properties and behaviors of the system as a whole. By analyzing and understanding the emergent

characteristics of the conflict, resolution approaches can be designed to address the underlying systemic factors contributing to the conflict.

Conflict resolution processes that incorporate emergent properties focus on creating an environment for new patterns, relationships, and solutions to emerge. It involves promoting dialogue, collaborative problem-solving, and the exploration of alternative perspectives. By addressing the systemic dynamics and encouraging the emergence of novel approaches, conflict resolution efforts can lead to more sustainable and transformative outcomes.

10. Continuous adaptation

The principle of maintaining a preferred system purpose through adaptation and objectives throughout the lifecycle of conformance to environmental demands and system changes (Jones & Van Ael, 2022)

System maps are often used to depict the relationship between design concepts and the activities or scenarios that unfold over time within social systems. For example, service journeys or long-range foresight models can be represented through timeline models to capture the temporal dynamics of the system.

One common mistake in systemic design is assuming temporal consistency, assuming that current system processes will continue uninterrupted into the future until the next planned intervention. However, complex social systems often experience unexpected temporal bifurcations, where processes diverge unexpectedly, or social regimes break down. Human observers are often unable to predict or anticipate these shifts accurately.

While social systems can exhibit self-organizing tendencies, they are not inherently self-ordering. Organizational and institutional systems adapt to environmental demands through individual responses and communication protocols. However, achieving collective evaluation or innovation requires continuous adaptation to changing environments, societal shifts, market dynamics, and the participants within the system.

Designing social systems with a systemic approach requires ongoing evaluation, measurement, and judgment to assess delays, intention drift, time-dependent functions, the diffusion of change, and the adoption of strategies. Stakeholders in various design and monitoring roles play a crucial part in identifying variations over time, signaling emergent situations, and co-designing adaptive responses. This adaptive monitoring contributes to organizational resilience and strategic flexibility.

Continuous adaptation is vital for maintaining the purpose and objectives of a social system throughout its lifecycle, aligning with environmental demands, and accommodating related changes. Effective systemic design incorporates the principle of continuous adaptation throughout the entire design process, from initial design and development phases to deployment and operation. By integrating cyclic feedback deeply into the social practices of the organization, systems can become resilient in the face of unforeseen environmental requirements and system breakdowns.

When considering conflict and conflict resolution within social systems, the concept of temporal pacing and continuous adaptation becomes relevant. The temporal dynamics of

the system, including how events unfold over time and how individuals or groups respond, can significantly influence the escalation or resolution of conflicts. Continuous adaptation and evaluation are essential in addressing conflicts and finding sustainable resolutions. This involves regularly scanning, measuring, and judging the evolving dynamics of the conflict, as well as assessing the effectiveness of strategies and interventions. By actively monitoring and adapting to changes in the conflict environment, stakeholders can identify emerging situations, adjust their approaches, and co-design adaptive responses that promote resolution and reconciliation.

The principle of continuous adaptation can also contribute to organizational resilience in the face of conflicts. Incorporating feedback loops and adaptive practices into conflict resolution processes, social systems can better navigate and manage conflicts over time. This flexibility allows for the exploration of alternative solutions, the accommodation of changing needs or interests, and the prevention of future conflicts.

11. Self-organizing

A core principle for facilitating any size or type of group as a social system. In design, we enable actions that increase awareness and motivations to accelerate self-organizing. Higher complexity social projects require cooperative organization among multiple actors that are not regulatable through coordination, due to social complexity. Creative processes can break through system boundaries, and through self-transcendence, reach higher states of organization (Jones & Van Ael, 2022).

The principle of self-organization is based on the idea that dynamic systems, even simple machines, actively seek to stabilize interrupted states by finding equilibria that

accommodate the environment and the available states. In social systems with rich variety, there are numerous available states that support self-organization. Self-organization provides a framework for understanding how conflicts can be addressed and resolved within social systems. It highlights the capacity of systems to adapt and evolve in response to changing circumstances, including conflicts. Self-organizing systems have the potential to learn from conflicts and find new states of organization that accommodate the needs and interests of the involved parties.

Conflict resolution can be seen as a self-organizing process within social systems. It involves the participants engaging in dialogue, negotiation, and problem-solving to reach agreements and restore harmony. The principles of self-organization, such as flexible responses, learning, and creative processes, can inform conflict resolution efforts. Moreover, self-organizing systems emphasize the importance of participation and inclusiveness. In conflict resolution, involving all relevant stakeholders and giving them a voice can enhance the self-organizing capacity of the system. It allows for diverse perspectives to be considered, fosters shared understanding, and increases the likelihood of finding mutually acceptable solutions.

However, it's important to note that self-organization alone may not guarantee successful conflict resolution. Designed structures and processes, such as facilitated dialogue or mediation, may be necessary to create a supportive environment and guide the self-organizing processes towards constructive outcomes.

The design principles presented aim to guide designers and systems theorists in understanding systemic principles in complex problem areas and are applicable to conflict analysis and

resolution, because conflicts as discussed previously is in reality a design problem. These

principles include human-centeredness, convening stakeholders with personal stakes, dialogic

processes, iterative inquiry, and multiple design actions over time (Jones P. , 2014).

6 Conclusion

In this diploma thesis, the topics of conflicts and conflict resolution were explored in terms of approach framework. Traditional approaches that emphasize linear types of reasoning (assuming that a single cause is responsible for a particular effect), static conflict analysis that provide snapshots of a specific point of time are still being employed while there is a cross-wide consensus that conflicts have become much more dynamic and complex to understand. Experts and practitioners in conflicts attempted to address complexity by drawing knowledge from the Systems Thinking literature. They argued that systems approaches provide new perspectives, insights and can complement traditional frameworks and methods because they help identify driving factors, leverage points, and bottlenecks for positive change. Particularly one systems approach is more profound than others and that is System Dynamics; a computer-based mathematical modeling approach that helps to understanding nonlinear behavior of a complex system over time using stocks, flows, internal feedback loops, table functions, and time delays. A thorough review of the limitations of System Dynamics was provided with the key takeaway stating that the deterministic nature of system dynamics tends to offer one picture of the situation and one solution which can privilege the perspectives of powerful groups and exclude marginalized voices. This occurs because the power of System Dynamics lies in the agreement that one truth exists so that it can produce clear results which is ideal for complicated-unitary problems but in the case of conflicts, where multiple perspectives and truths about the system exist, who decides the inputs of the system, and if they are inputted, what amount of the complexity can they capture in a simplistic cause-effect manner? Who decides what is right about the system's behavior? The suggestion to conflict practitioners who are interested on

employing systems thinking, is to explore other systems approaches that are more appropriate to deal with systems that their primary issue is conflict, because these systems tend to be complex-coercive where the stakeholders have few or no common interests and power dynamics play a significant role. This lands us to the research questions of this diploma thesis, that are:

1) What is the value of Critical Systems Practice (CSP) in conflicts and conflict resolution?

2) What is the value of Systemic Design in conflicts and conflict resolution?

For question 1) the identified value lies in the ability of CSP to address complex real-world problems, something that traditional linear approaches cannot.

CSP is consisted of four key pillars: systems thinking, critical awareness, pluralism, and improvement.

Systems thinking promotes holistic understanding and interconnections in contrast to reductionism, making the appropriate way to approach complexity.

Critical awareness recognizes that each social theory can have impact to society, so the practitioner should think critically on which theory answers the needs of the system. For example, if the primary issue of the systems is conflict, the practitioners should shift their attention to the sociological paradigm of radical change, because the systems perspective of the system is that of a coercive system:

- Considers organizations as instruments of domination and exploitation.
- Recognizes different social groups and their often-irreconcilable interests.
- Emphasizes the power dynamics within organizations and societal structures.
- Calls for the empowerment and emancipation of oppressed individuals and groups.
- Evaluates the organizations in terms of social injustice, equality, and liberation.

If the system's problem checks the above elements, then the appropriate methodology can be identified. CSP though, doesn't employee only one methodology, and that's where the next fundamental point of pluralism lies.

Pluralism in this context refers to embracing a variety of systems approaches and methodologies, utilizing their strengths while compensating for their weaknesses. The adoption of a multimethod approach enhances flexibility and preparedness in dealing with rapidly changing problems. To effectively apply pluralism, different methodologies based on the problem situation's characteristics should be used, represented by the axes of systems (complex, complicated, simple) and stakeholders (unitary, pluralist, coercive). By identifying the position of the problem situation, the appropriate methodology can be selected. However, if the problem's issues are diverse, the practitioner must critically evaluate which methodology should be dominant based on the primary issues' nature. If the non-primary issues differ in nature, a different methodology can be employed accordingly. Flexibility is key in adopting a spectrum of methodologies.

The key takeaway from this passage is the commitment to "improvement" in the context of Critical Systems Practice (CSP). Improvement encompasses various aspects such as efficiency, efficacy, effectiveness, viability, sustainability, mutual understanding, empowerment, and emancipation.

The final pillar of CSP is improvement in terms of efficiency and viability, interventions should be critiqued from the perspective of all affected stakeholders. If an intervention threatens the best interests of disadvantaged stakeholders, it should be abandoned. The needs of disadvantaged stakeholders should be given equal weight in the decision-making process, and their improvement should be prioritized alongside other benefits. From an emancipatory perspective, the position and improvement of disadvantaged stakeholders should be weighed as much as any

other benefits that may result from the intervention. Emancipatory systems thinking becomes dominant in situations where emancipation is the primary goal. Two types of emancipation exist. The first is emancipation through discursive rationality, which emphasizes communication free from domination. It involves stakeholders determining their true interests through undistorted communication. Approaches such as Beer's Team Syntegrity and Ulrich's Critical Systems Heuristics complement this perspective by promoting open, non-hierarchical, and participative decision-making.

The second type is emancipation as liberation, which focuses on critiquing existing social systems and proposing alternative arrangements to liberate specific groups from oppressive structures. This approach draws inspiration from Karl Marx's work on class struggle and aims to address discrimination based on factors such as gender, race, sexual orientation, disability, and environmental sustainability.

To justify these theories and apply them within the context of critical systems practice, approaches such as communicating the appropriate theory to oppressed groups, employing interpretive systemology to encourage debate and enriched consciousness, and adopting Bhaskar's critical realism to reveal structural mechanisms that perpetuate false interpretations of social reality are proposed.

These approaches aim to raise awareness, challenge false consciousness, and empower oppressed groups to effect change. Liberating Systems Theory (LST) specifically focuses on identifying and addressing complex structural mechanisms that sustain oppression through coercion.

In conclusion, the use of systems methodologies within CSP not only promotes paradigm diversity and effective system development but also offers valuable insights and tools for conflict

resolution. By acknowledging the link between paradigms and conflict, employing diverse methodologies, and embracing emancipatory perspectives, CSP contributes to a more comprehensive and inclusive approach to conflict resolution, ultimately fostering greater understanding, collaboration, and sustainable outcomes in complex conflict situations, and that's the value that CSP provides to conflicts and conflict resolution.

For question 2) the identified value lies in the ability of Systemic Design that addresses complex challenges by integrating design thinking and systems thinking. More specifically:
Conflict and conflict resolution are relevant in the context of systemic design. In the process of addressing complex, multi-system, and multi-stakeholder challenges, conflicts can arise due to differing perspectives, interests, and goals. Conflict may stem from competing priorities, power dynamics, resource allocation, or conflicting values within the system.

Conflict in systemic design can be seen as an opportunity for learning and growth. It brings forth diverse viewpoints and challenges existing assumptions, leading to a deeper understanding of the complexity at hand. However, if conflicts are not managed effectively, they can hinder progress and prevent the achievement of desired outcomes.

Conflict resolution in systemic design involves the facilitation of dialogue and collaboration among stakeholders. It requires creating a safe space for open communication, active listening, and empathy. Systemic designers play a crucial role in guiding the resolution process by encouraging mutual understanding, identifying common ground, and exploring creative solutions.

Systemic design principles, such as appreciating complexity and purpose finding, are instrumental in conflict resolution. By acknowledging the interconnectedness of systems and

understanding the underlying causes of conflicts, designers can address root issues rather than treating symptoms. They can also help stakeholders align their goals and interests with the broader systemic context, fostering shared ownership and commitment to resolving conflicts.

Systemic design approaches, such as systems mapping and visual communication practices, can aid in conflict resolution by providing a visual representation of the complex system and its interdependencies. These tools facilitate sensemaking, enabling stakeholders to identify the sources of conflict, visualize potential trade-offs, and explore alternative pathways for resolution.

Furthermore, systemic design emphasizes the importance of continuous adaptation and self-organizing in the face of conflicts. It recognizes that systems are dynamic and evolving, and conflict resolution processes should be flexible and responsive to changing circumstances. Iterative cycles of design thinking and feedback coordination allow for ongoing refinement and improvement of conflict resolution strategies.

In conclusion, conflict and conflict resolution are integral aspects of systemic design. While conflicts can arise due to the complexity of multi-system and multi-stakeholder challenges, systemic design offers principles and tools for effective conflict resolution. By embracing conflicts as learning opportunities, fostering dialogue, and utilizing systemic design approaches, designers can navigate conflicts and guide stakeholders toward collaborative solutions that address the underlying complexities of the system. Understanding the relationship between conflict and conflict resolution requires an exploration of various systemic design principles. These principles provide insights into how conflicts can be addressed and resolved effectively within the context of systems thinking and design. Idealization serves as a starting point for conflict resolution by envisioning an ideal state and identifying necessary changes. Appreciating complexity recognizes the intricate nature of conflicts and emphasizes the need for a flexible,

holistic, and collaborative approach to resolution. Purpose finding involves understanding the underlying drivers and motivations of conflicts to find common ground and reach resolutions. Boundary framing involves framing the problem and considering various boundaries to gain a comprehensive understanding of the conflict. Reframing allows parties to shift perspectives and explore alternative viewpoints, leading to new insights and potential solutions. Requisite variety emphasizes the importance of incorporating diverse perspectives and stakeholder involvement to address conflict effectively. Feedback coordination involves incorporating feedback loops to guide the performance of a system and achieve desired outcomes in conflict resolution. System ordering focuses on arranging and defining relationships within a system to promote clarity, coordination, and effective communication. Leverage impact entails identifying critical points or moments of intervention where small actions can have significant impacts on the overall system. By considering these systemic design principles, individuals involved in conflict resolution can navigate the complexities of conflicts, understand the underlying causes and dynamics, and work towards sustainable and mutually acceptable solutions. Effective conflict resolution requires a comprehensive and interdisciplinary approach that incorporates the principles of systems thinking and design.

7 Limitations

Both suggested approaches to conflict and conflict resolution:

While Critical Systems Practice (CSP) offers valuable insights and tools for addressing complex real-world problems, including conflicts, it is important to acknowledge certain limitations in its application to conflicts and conflict resolution. Here are some of the limitations to consider:

1. Simplification of complex conflicts: While CSP encourages systems thinking and holistic understanding, conflicts can involve deeply rooted issues, diverse perspectives, and intricate dynamics that are difficult to fully capture or simplify within a single systems perspective. Conflicts often emerge from a web of interrelated factors and oversimplifying them may overlook critical nuances and hinder the effectiveness of conflict resolution efforts.

2. Limited emphasis on power dynamics: While CSP recognizes power dynamics within organizations and societal structures, it may not fully address the complexities and asymmetries of power in conflicts. Power imbalances can significantly influence the course and resolution of conflicts, and addressing power dynamics requires specific attention and strategies that may go beyond the scope of CSP methodologies alone.

3. Challenges in embracing pluralism: While pluralism is a pillar of CSP, embracing a variety of systems approaches and methodologies in conflict resolution can be challenging. Conflicts often involve diverse stakeholders with conflicting interests and values, making it difficult to integrate multiple perspectives and methodologies into a cohesive and effective approach. Balancing the

application of different methodologies while ensuring coherence and consistency can be complex.

4. Limited attention to time and urgency: Conflict resolution often requires timely interventions to prevent further escalation and harm. CSP methodologies, with their emphasis on critical awareness, pluralism, and holistic understanding, can be time-consuming and may not always align with the urgency of conflict situations. The need for immediate action and time constraints may limit the application of CSP methodologies in certain conflict contexts.

5. Practical constraints: Implementing CSP in conflict resolution may face practical challenges, including limited resources, stakeholder resistance or non-cooperation, and constraints imposed by existing structures and systems. Applying CSP effectively requires commitment, collaboration, and resources, which may not always be readily available or feasible in conflict settings.

6. Ethical considerations and value conflicts: CSP acknowledges the importance of ethical considerations and stakeholder participation. However, conflicts often involve value conflicts, where stakeholders have deeply held beliefs and interests that may not easily align or be reconciled. Resolving value conflicts requires navigating complex ethical dilemmas and finding ways to bridge divergent perspectives, which can be challenging even with the application of CSP methodologies.

7. Limitations of emancipatory perspectives: While emancipatory perspectives within CSP aim to address social justice and empower disadvantaged groups, their application in conflict resolution may face obstacles. Conflicts often involve competing interests and power struggles, making it challenging to achieve consensus on the nature and extent of emancipation. Balancing

different stakeholders' needs and aspirations can be complex and may require additional approaches beyond the scope of CSP alone.

In summary, while CSP offers valuable contributions to conflicts and conflict resolution, it is important to recognize its limitations. Conflicts are complex, dynamic, and deeply rooted in diverse perspectives, power dynamics, and value conflicts. The application of CSP in conflict resolution should be complemented by other approaches, tailored to the specific context, and consider the practical constraints, ethical considerations, and power dynamics at play.

While systemic design offers valuable principles and approaches for understanding and addressing conflicts, it is important to acknowledge its limitations in the context of conflict resolution. The following are some of the limitations that need to be considered when applying systemic design to conflicts:

1. Complexity and unpredictability: Conflicts are inherently complex and dynamic phenomena, influenced by various factors such as power dynamics, emotions, and cultural differences. While systemic design principles emphasize appreciating complexity, conflicts often involve unpredictable and emergent behaviors that can challenge the effectiveness of predefined interventions. It can be challenging to fully grasp the intricacies of a conflict system and accurately predict its outcomes.

2. Subjectivity and bias: Systemic design is influenced by the perspectives and biases of the designers and stakeholders involved. The identification and framing of the problem, as well as the selection of boundaries and feedback loops, can be subjective and influenced by individual

interpretations. Conflicts can also be deeply rooted in differing worldviews and ideologies, making it difficult to achieve a shared understanding or agreement on the design approach.

3. Ethical considerations: Systemic design interventions in conflicts raise ethical concerns. Designers need to navigate power imbalances, ensure inclusivity, and avoid reinforcing existing inequalities or marginalizing certain stakeholders. Design interventions that overlook or disregard the needs and rights of certain parties can perpetuate or escalate conflicts rather than resolving them.

4. Time and resource constraints: Conflict resolution often requires timely interventions to prevent further escalation or harm. However, systemic design processes can be time-consuming and resource-intensive, involving extensive research, stakeholder engagement, and iterative design iterations. In urgent conflict situations, the luxury of extensive systemic design processes may not be available.

5. Contextual limitations: Systemic design principles may not adequately consider the contextual and cultural nuances of conflicts. Different conflicts have unique historical, social, and cultural backgrounds, which may require tailored approaches beyond the general principles of systemic design. Applying systemic design without proper contextual understanding can result in ineffective or inappropriate interventions.

6. Lack of consensus and cooperation: Conflicts are often characterized by deep-rooted divisions and lack of consensus among the parties involved. Systemic design relies on collaboration, dialogue, and the participation of diverse stakeholders to develop shared solutions. However, in highly polarized conflicts, achieving such cooperation and consensus may be extremely challenging, limiting the effectiveness of systemic design approaches.

7. Limited control and influence: Designers implementing systemic design interventions in conflicts may have limited control or influence over the actions and decisions of the conflicting parties. While systemic design can provide insights and potential pathways for resolution, the ultimate success of conflict resolution depends on the willingness and commitment of the parties involved to engage in the process and implement the recommended solutions.

In summary, while systemic design principles can contribute to conflict resolution, it is essential to recognize their limitations. Conflicts are complex, unpredictable, and deeply rooted in subjective perspectives and power dynamics. Systemic design should be applied with caution, considering the ethical implications, contextual factors, and the challenges inherent in achieving consensus and cooperation among conflicting parties. It should be seen as a complementary approach to other conflict resolution methods and adapted to the specific needs and dynamics of each conflict situation.

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