

Envisioning transformation structures to support ethical mediation practices

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Abstract: Ethics is complex and situated, involving many stakeholders that impact the design of technology systems. Numerous methods and tools have been proposed to enable practitioners to address ethical issues in the workplace. However, little work has described how designers themselves understand and seek to respond to that ethical complexity. In this short paper, we present five transformation structures that visually and relationally depict how ethics might be addressed in a workplace setting. We base these structures on analysis of plans that 39 practitioners and students created in a co-design workshop to address an ethical concern in their job role. We evaluated the diagrams of these workshop plans and identified five different types of structures that could lead to potential transformation of ethical practices: parallel, linear, top-down, loopy, and gordian. We identify how these transformation structures differently inscribe expectations of ethical mediation and action, leading to opportunities for further support of ethical practices by practitioners.

Keywords: ethical mediation; design ethics; design methods; ethical design complexity

1. Introduction

Designers engage with ethical questions continuously, seeking to balance the needs of shareholders and profit, design quality, regulatory forces, and current or potential future social impact (Dindler et al., 2022; Gray & Chivukula, 2019; Lindberg et al., 2021). This engagement with ethics is morally fraught and complex (Chan, 2018; Friedman & Hendry, 2019; Shilton, 2018; Verbeek, 2006), requiring designers to not only be aware of the ethical nature of their work, but also be able to leverage various methods or sources of knowledge to confront ethical challenges that they face (Gray et al., 2023).

While numerous tools and methods exist to engage designers in more ethical practices (Chivukula et al., 2022), these tools are not sufficient to produce action. As noted by the authors of a Conversation from DRS 2022, “ethics may best be framed as an invitation to care,



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without reducing it to a checklist, toolkit or an afterthought that can be added onto the design process” (Ozkaramanli, Nagenborg, et al., 2022). This articulation of ethics as something that is everyday, personal, and connected to action underscores aspects of our approach in this paper. We report on analysis of action plans that design and technology students and practitioners created to support their own ethical engagement in their work environment, seeking to describe structural aspects of these plans that might encourage different local interventions in future work.

In this paper, we make two primary contributions to the design research literature. First, we coin the concept of transformation structures to describe aspects of ethical complexity and potential for organizational transformation using visual-structural qualities of ethics-focused action plans generated by practitioners. Second, we describe five different transformation structures based on analysis of practitioner-created action plans, indicating strengths and weaknesses of these structural forms in engaging and exposing ethical complexity.

2. Related Work

2.1 Ethics and Design

The concept of ethics is central to the design literature, even if it is not always articulated as such (Gray & Boling, 2016). As described by Nelson and Stolterman (2012), design is a world-building and shaping activity, whereby the designer creates the *not-yet-existing*. Thus, design work is inherently normative—expressing both values and politics that are inscribed into the artifacts and systems we as designers shape and seek to change (Costanza-Chock, 2020; Verbeek, 2006; Willis, 2006). Typical approaches to encouraging ethical behavior by designers have included articulating binding or non-binding codes of ethics (Buwert, 2018), engaging students in case studies or discussion activities (Hess & Fore, 2018), or using frameworks or methodologies such as Value-Sensitive Design (VSD) to guide action (Friedman & Hendry, 2019).

Frequently, ethical engagement has been framed in relation to dominant paradigms of ethics or moral philosophy, with codes of ethics serving as a common example of deontological ethics (Buwert, 2018), notions of designer responsibility and design character serving as a common instantiation of virtue ethics (Nelson & Stolterman, 2012; Senova, 2023), and design evaluation and impact assessment serving as a common way of thinking through social outcomes of design in ways that parallel consequentialist ethics commitments (Lloyd & Busby, 2003). However, more recent approaches to ethical engagement have also focused on the critical engagement that designers can leverage, considering how design might better center diverse human needs and acts of resistance through approaches such as *design justice* (Costanza-Chock, 2020) or *data feminism* (D’Ignazio & Klein, 2020).

2.2 Practice-Led Approaches to Design Ethics

Engaging designers in ethical awareness and action is not straightforward. As articulated by Gray and Chivukula (2019), the ethical design complexity that designers face encompasses

“complex and choreographed arrangements of ethical considerations that are continuously mediated by the designer through the lens of their organization, individual practices, and ethical frameworks.” This complexity—echoed in recent work by Lindberg and colleagues (Lindberg et al., 2021, 2020)—shows why overly prescriptive or abstract guidance often has little impact on design practices, requiring attention to how ethics is mediated by organizational and disciplinary forces. For instance, multiple studies have shown that even when designers are aware of relevant codes of ethics, this awareness often does not translate into ethical design decisions (Chivukula & Gray, 2020; Gray et al., 2021; McNamara et al., 2018). In parallel, designers can often take advantage of the messiness of organizational design practices to create meaningful change. For instance, Shilton (2013) described how stakeholders could be better of awareness and able to operationalize values by linking them to strategic activities, resulting in a framing of these activities as “values levers”: “practices that open new conversations about social values and encourage consensus around those values as design criteria.” Wong (2021) also recently described how designers in complex industry contexts could use forms of “soft resistance” to create more space for values-related conversations in UX work, make these value relationships visible to other stakeholders, and even use subversive tactics to embed human values rather than capitalist values into the systems they design.

In this paper, we build upon these practice-led framings of design ethics that privilege the voice and actions of the designer themselves. In doing so, we seek to provide meaningful supports to design practitioners through a set of transformation structures to make change in their own work environments and individual practices in a pragmatist, action-oriented way.

3. Our Approach

In this paper, we used an artifact analysis approach to analyze the structural relationships of 39 action plans generated by practitioners and students in technology and design fields with the intent of addressing ethical mediation in their daily practice. This study is a part of a larger co-creation study where we engaged designers and technologists across eight three-hour workshops. In this section, we share information about the co-creation workshops, our data collection procedures, and analysis of the outcomes to present the results.

3.1 Data Collection

We designed a co-creation workshop that provided participants with co-creation material they could use to generate an “action plan” that they may later choose to incorporate into their everyday work practices. The focus of these action plans was on ethical issues participants faced in their workspace, and we supported participants in using a variety of materials to create plans to either become more ethically aware or able to act. The co-creation materials participants were provided included:

- *Building blocks* drawn from a collection of *ethics-focused methods* intentionally designed to support ethical decision making drawn from (2022).

- A set of *actors* such as designer, product manager, software engineer, team, CEO/Founder, society, and user that defined a range of stakeholders in everyday design and technology work.
- *Framing methods* that provided avenues to list design goals, stakeholders involved, individuals affected, design intentions, organizational practices, and current practices.
- *Relational verbs* that would allow participants to draw connections among the above elements such as evolve, inscribe, strengthen, discourage, constrain, and obstruct.

The participants could also add their own elements to the provided co-creation material to align the action plan with their situation. The workshop design led the participants through a design process to define their ethical concerns, generate a problem frame that they would like to address, choose various co-creation material provided, draft an action plan based on their problem frame and chosen material, iterate on the plans in conversation with their fellow participants, and present and discuss how their action plan addresses various complexities they face in their everyday work. Participants co-created a range of material during the workshop including problem cards consisting of ethical concerns, action plans, and iterated action plans for multiple problem cards (see different stages presented in Figure 1). One of the final outcomes of the co-creation workshop were the action plans (created in 4. DIY Room in Figure 1) generated through supported material created through the previous stages (1. Welcome and 3. The Shop in Figure 1), which were used as a unit of analysis for this paper. More extensive details regarding the workshop design can be found in Li et al. (2023) and Gray et al. (2024).

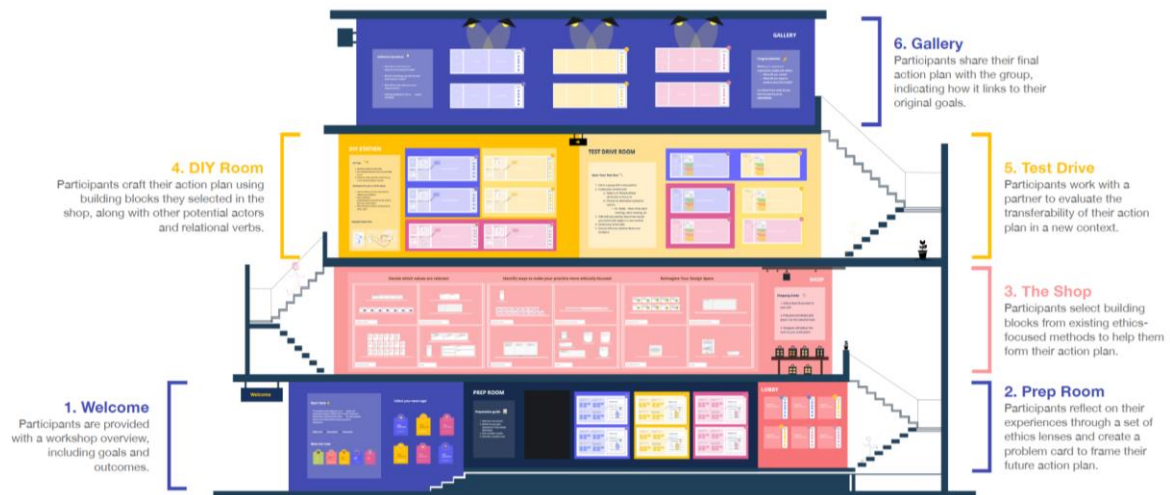


Figure 1 Co-Creation Workshop Setup (Figure reproduced from Gray et al., 2024)

We conducted workshops online (six sessions) using Miro digital whiteboards and in person (two sessions) using printed co-creation material with group size ranging from 3-6 people per workshop. Across the eight workshops, 13 technology and design practitioners and 26

students in design and technology fields participated across a range of professional roles, including: UX Designers, UX Researcher, Product Managers, Data Scientists, Software Engineers, and Data Engineers. This diversity of job roles allowed us to capture a range of ethical concerns, organization types, hierarchy and responsibilities, and years of experience. Industry participants were expected to have at least two years of industry experience and students were expected to have at least an internship experience in order to participate. Our main goal through this paper was not to differentiate outcomes based on participant type, professional role, and/or organization type; instead, we sought to describe how a range of practitioners who experienced different forms of ethical complexity address saw opportunities transform their everyday ethical concerns and dilemmas through the creation of an action plan. The co-creation material, protocols, and participant consent forms were all approved by our Institutional Review Board. The focus of this paper is not the design and dissemination of the co-creation workshops, but rather the visual organization of the action plans generated as outcomes of the workshop.

Through these workshops, we collected 39 completed action plans—one per participant—which we treat as the artifacts of analysis to answer the research question: *What do the visual-structural relationships of the action plans tell us about how a range of technology/design practitioners and students attempt to address ethical design complexity in their everyday work?*

3.2 Data Analysis

We conducted analysis on the 39 action plans in two different steps. First, we collected all the action plans on a new Miro board to familiarize and sensitize ourselves towards the range of elements (including the provided and participant-generated co-creation material) that were used and the ways they were used in juxtaposition to each other. We primarily focused on the structural relationships, visual organization, and assembly of given elements treating the whole action plan as our unit of analysis. This analytic step excluded the analysis of discrete elements used as a part of the action plan and rather a zoomed out version of the “form” or structure represented in the action plan. We did not intend to reiterate what the action plans specifically contained, but instead focused on how the visual organization or structural aspects of the action plans inform how the participants understood the ethical complexity in their work environment. From this point forward, we evaluated each action plan as one complex visual form to support further structural analysis.

We then identified a range of visual structures used in the action plans—either as the entire action plan structure or dominant structures within the plans—such as lists/guidelines, linear flows, cause/effect relationships, linear processes, loops, concentric relationships, inward branches, outward branches, inter-connected sections, independent sections, inter-tangled components, and broad vision statements. We identified action plans that used multiple structures at once, but in these cases we focused only on the most salient or dominant structure. Through an interpretivist and reflexive process, we then constructed the five ab-

struct transformation structures, recognizing that these forms *anticipate* and structure a designer or technologists' expression and reflection upon ethical responsibility and action in their everyday work. We narrowed the identified structures to five primary abstract forms: Parallel Forms, Linear Paths, Top-Down, Loopy, and Gordian (Figure 2). We identified these dominant visual forms as *transformation structures* which organize and describe how practitioners anticipate addressing ethical complexity in their everyday work. These transformation structures have analytic value in demonstrating how practitioners activated their understanding of ethical complexity and assumptions as they anticipated taking action in such situations (Section 5.1), as well to inform future research in ethics-focused methods and support design (Section 5.2). We then coded the 39 action-plans exclusively using these five abstractions. We have created illustrated examples of the transformation structures as an overlay on the generated action plans as examples of our process of visual analysis as referred to in Figures 2-5.

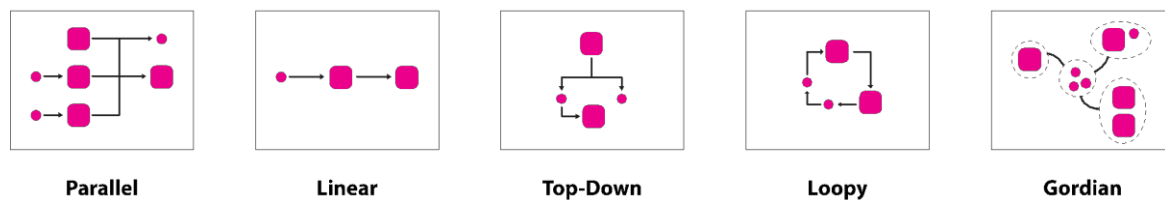


Figure 2 Visual representation of five types of transformation structures (described in Table 1).

4. Five Transformation Structures

Based on the analysis of the structural relationships in the action plan, we identified five types of *transformation structures* practitioners and students used to identify, address, and potentially transform their ethical mediation practices with the knowledge they had about their practice and elements we have provided during the co-creation workshop. The five structures are: Parallel Forms, Linear Paths, Top-Down, Loopy, and Gordian (Figure 1 and Table 1). In this section, for each transformation structure we provide a description of how the structure can be identified visually and what its structural relations imply for ethical action and responsibility, variation in visual forms (if any), limitations of the structure in modeling aspects of ethical design complexity, and an example of the structure.

Table 1 Description of transformation structures.

Transformation Structure	Description
Parallel Forms	indicate that a stakeholder anticipates addressing ethical design complexity through two or more strands of ethical action, inscribing their ethical responsibility as a distributed or shared outcome. (Two Forms: Branching and Sectioning)

Linear Paths	indicate that a stakeholder anticipates addressing ethical design complexity through two or more procedurally related practices in a sequence, visually modeling ethical action and responsibility as straightforward and ethical outcomes as inevitable.
Top-Down	represent a hierarchical relationship where a stakeholder anticipates addressing ethical design complexity through an overarching prescribed practice that then trickles down to impact lower-level subsequent practices, inscribing ethical action and responsibility as a principle-based and influential practice.
Loopy	indicate that stakeholder anticipates addressing ethical design complexity through the coordination of two or more practices that are repeated over time, envisioning ethical action as a continual process.
Gordian	indicate that a stakeholder anticipates addressing ethical design complexity through two or more loosely related sets of practices that are not definitively linked in sequence, implying that ethical action and responsibility is complicated and situationally complex. (Two Forms: Gordian knot and List)

4.1 Parallel Forms

Parallel Form structures indicate that a stakeholder anticipates addressing ethical design complexity through two or more strands of ethical action, inscribing their ethical responsibility as a distributed or shared outcome. The parallel forms could exist across different stakeholders, practices, methods, and/or processes informing ethical complexity. These structures are visually modeled in two forms: 1) *Branching*, where a certain plan has multiple flows of action leading towards a shared outcome; and 2) *Sectioning*, where a certain action plan has separate strands informing ethical action at different levels of hierarchy or stakeholders tackling ethical complexity in their own capacity. For example, as seen in an action plan in Figure 3(a), the practitioner illustrates branching as they drew an action plan with three strands of action. All three branches of action have used different evaluative methods based on different actors to converge on a list of ethical objectives that are shared across all these different actors. Another example, as seen in Figure 3(b), the practitioner illustrates sectioning as they started with a method to brainstorm unethical consequences. That process then sectioned into defining values for stakeholders at the organizational level and the use of other framing methods by designers and product managers. In this example, the ethical action is distributed across different stakeholders but rooted in the same starting point. These transformation structures include a shared (in the case of Branching) and distributed (in the case of Sectioning) sense of ethical responsibility, assuming that ethical action will ultimately be successful or possible if the plan is followed, but without deep inspection into



4.2 Linear Paths

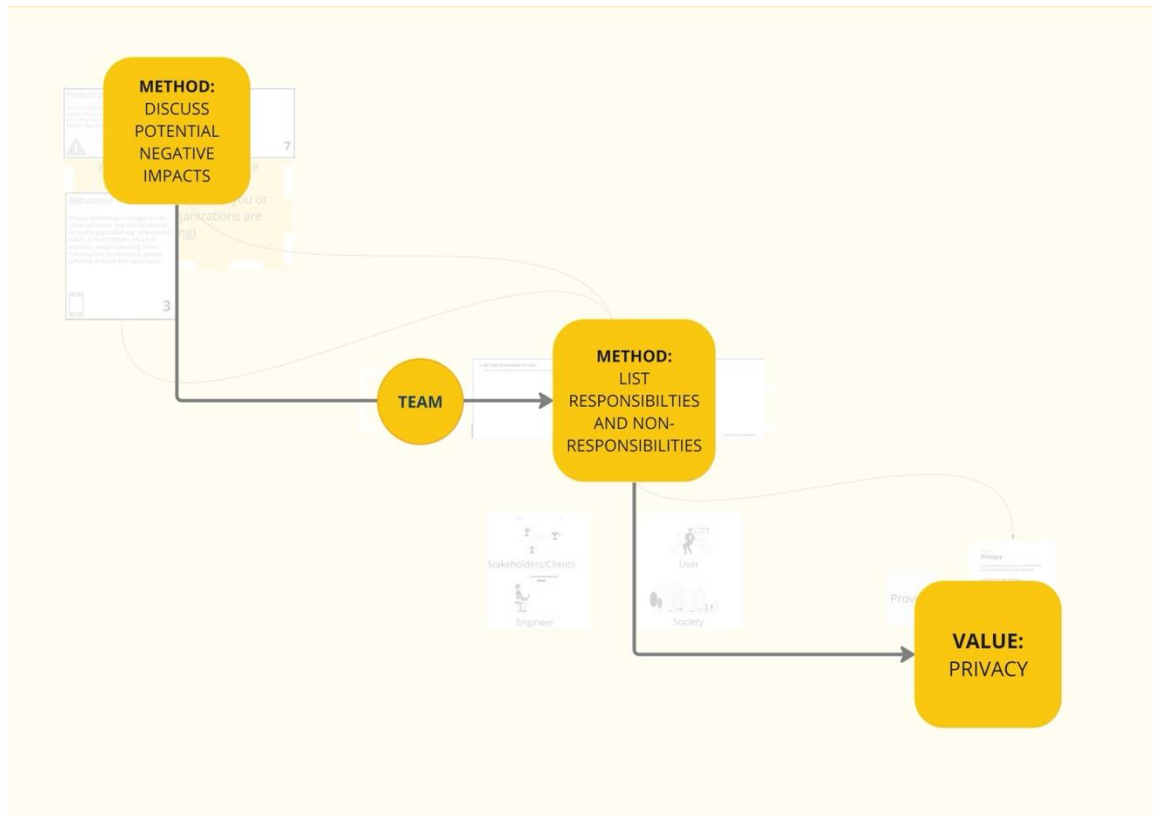


Figure 4 Example to illustrate Linear Path transformation structure.

Linear Path structures indicate that a stakeholder anticipates addressing ethical design complexity through two or more procedurally related practices in a sequence, visually modeling ethical action and responsibility as straightforward and ethical outcomes as inevitable. For example, as seen in an action plan in Figure 4, the practitioner illustrates linearity in their action plan by indicating how they would follow a set of methods beginning with listing potential negative impacts, sorting what the team should be responsible and not responsible for, which then led to ethical designs promoting data privacy. This structure indicates a dependence on a set of practices that address specific aspects of ethical design complexity, thereby resulting in a desired human value or set of ethical objectives.

4.3 Top-Down

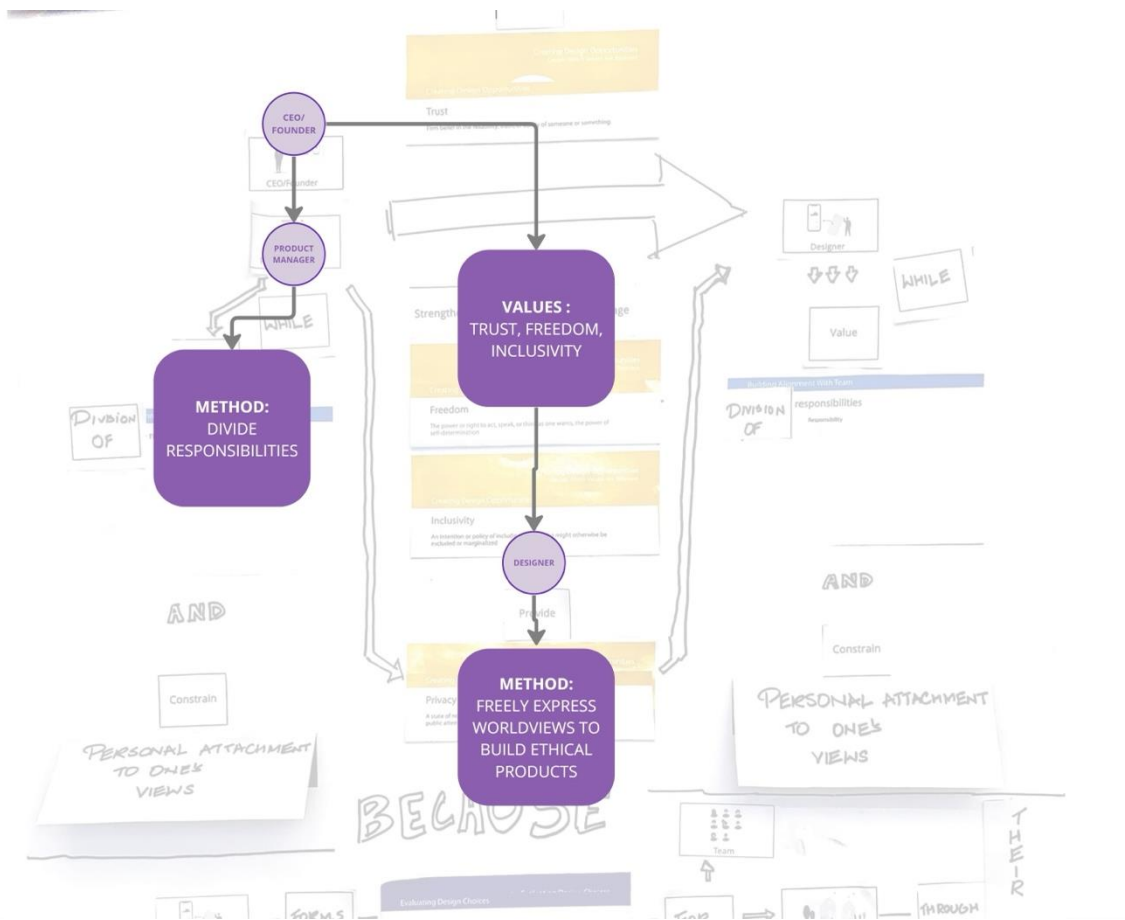


Figure 5 Example to illustrate Top-Down transformation structure.

Top-Down structures represent a hierarchical relationship where a stakeholder anticipates addressing ethical design complexity through an overarching prescribed practice that then trickles down to impact lower-level subsequent practices, inscribing ethical action and responsibility as a principle-based and influential practice. For example, as seen in an action plan in Figure 5, the practitioner positions the CEO/Founder at the top, visually indicating how that role shapes Product Manager actions towards valuing dividing responsibility, while also activating human values that then shape designer practices. In this transformation structure, the values of trust, freedom, and inclusivity to express a designer's ideas (treated as a lower-level stakeholder) to advocate for society's benefit trickles down from the CEO/Founder. This structure skews the ethical responsibility towards one set of practices or stakeholders involved in the ethical decision-making process, lowering the agency of the lower-level stakeholders in an organization and thus ignoring certain local complexities relating to ethical awareness or action.

4.4 Loopy

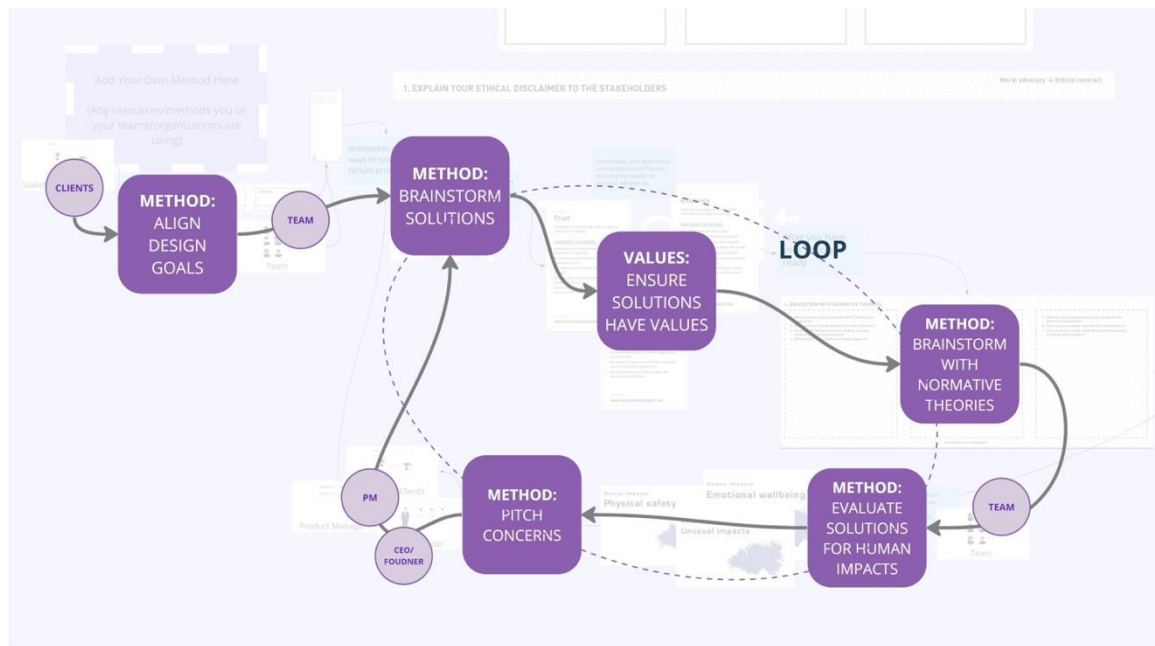


Figure 6 Example to illustrate Loopy transformation structure.

Loopy structures indicate that stakeholder anticipates addressing ethical design complexity through the coordination of two or more practices that are repeated over time, envisioning ethical action as a continual process. For example, as seen in an action plan in Figure 6, the practitioner illustrates a range of steps to continuously brainstorm and evaluate solutions, inspecting them for the presence of specific values and human impacts as a team. These identified values and impacts are then articulated to stakeholders/ CEO the end of a loop that then leads back to subsequent concept generation. This structure highlights and addresses ethical practices iteratively across multiple stages, requiring defined standards to find closure to the loop and not defining the range of resources required for the continuity. This transformation structure assumes a well-aligned view of ethical issues across multiple stakeholders and portions of the design process.

4.5 Gordian

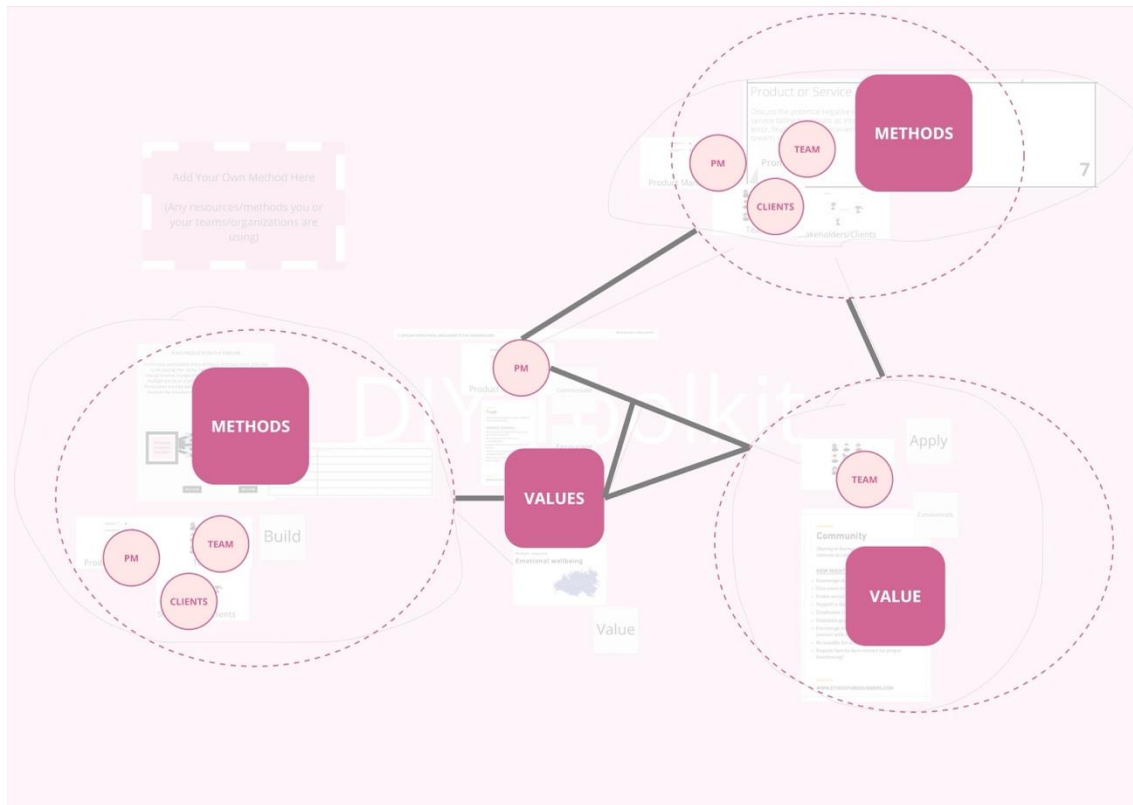


Figure 7 Example to illustrate Gordian transformation structure.

Gordian structures indicate that a stakeholder anticipates addressing ethical design complexity through two or more loosely related sets of practices that are not definitively linked in sequence, implying that ethical action and responsibility is complicated and situationally complex. This complexity is visually modeled in two forms: 1) *Gordian knot*, where different sets of practices across different stakeholders are connected but lacking a prescribed flow or directionality; and 2) *Lists*, where a set of broad guidelines are written down as holistic guidance for action, but lacking a plan for operationalization. For example, as seen in an action plan in Figure 7, the practitioner illustrates a different set of methods and values to follow across different stakeholders, connected with line segments without a proper sequence. While multiple values, stakeholders, and methodological interventions are identified in these loose structures, no specific lines connect these elements. This looseness, modeled either as an overarching list of items to consider or an unlinked set of practices, calls attention away from *who* should be activating these new processes or *how* they should go about this activation. This transformation structure replicates many of the facets of ethical complexity and potential for mediation—articulating ethical engagement as complex—but also implies that having awareness of a loose and unconnected set of practices will assure ethical action.

5. Discussion

In this paper, we have identified five transformation structures evident in action plans generated by technology and design students and practitioners—created as they sought to address ethical mediation and complexity in their everyday work. The five structures include Parallel Forms, Linear Paths, Top-Down, Loopy, and Gordian. In this section, we discuss two opportunities based on our findings: 1) Exposing how these transformation structures reveal different perspectives on how practitioners might address ethical complexity in their work; and 2) Using the five identified transformation structures as a pattern library towards generative and performance-oriented ethics-focused method assemblages.

5.1 Different Structures Lead to Different Views of Ethical Complexity and Potential Mediation

Based on our experiences as researchers working on ethical issues in design and technology practice for almost a decade, we drew connections on what these five abstractions could reveal about how the participants viewed or made sense of their current work environment and how they wanted to transform their situation. Thus, while the structures themselves cannot *provide* action, can occur in combinations, and are not exhaustive based on the nature of analysis, they can reveal how a practitioner understands and seeks to change their work situation in the future.

As we have described in the presentation of the five transformation structures, each structural form prioritizes certain actors, performative qualities, and organizational realities. Some structures such as Top-Down or the “list” form of Gordian assume that organizational structures will ensure alignment and the success of any intervention. In contrast, Parallel Forms or Loopy arrangements focus more on the distribution of responsibility, ensuring ethical outcomes through interventions that are either focused on role or iteratively constructed through role relationships over time. These structures reveal that no one transformation structure is sufficient to address all ethical issues in a complete way, and no one structural form can anticipate all forms of ethical design complexity. However, these five structures do naturally foreground certain types of complexity that might also lead to different views of how mediated practices might change the current situation.

In the Parallel Forms and Linear Paths structures, the primary focus is on individual responsibility that relates to shared outcomes. These structures assume that ethics is a distributed process where “it takes a village,” pushing back against notions that ethics only need to be considered by certain disciplines or job roles. These structures might be particularly useful in aligning a cross functional team and identifying shared responsibilities as well as individual responsibilities. However, for persistent or systemic ethical issues, Parallel Forms or Linear Paths might mask important root causes, leading to performative ethics or ethics “theater.”

In the Top-Down and list-oriented Gordian structures, the primary focus is on organizational alignment that acts through a deontological mandate. Frequently in organizations, these kinds of structures are accomplished through a vision or mission statement, but these efforts

often neglect the operational realities that activate the values implicit in a vision or mission statement. For instance, these structures call attention away from what an individual's professional role or power entails, what aspects of the project lifecycle they are supporting, and how they would be able to translate ethical concerns or awareness into impact.

In the **Loopy** and **Gordian** knot structures, the primary focus is on distributed and repeated tasks that are accomplished through multiple stakeholders. In these structures, the shared consensus about the current and desired state of ethics in the project lifecycle tends to be assumed, with the transformation structure playing the role of making these known practices part of the everyday operating procedures. With the Loopy structure, the shape and form of the operating procedures is explicit, while in the Gordian knot, the connections are implied or determined over time. If there is in fact consensus among stakeholders regarding key ethical issues, these could be effective structures, but if there are root causes or broader forms of ethical complexity that are not shared, the resulting plan would be unlikely to be successful.

Ultimately, the transformation structures embedded in a plan will foreground certain forms of ethical complexity while backgrounding others. Some structures may tend to be more performative if they do not engage with root causes (e.g., Top-Down, Parallel Forms) while others may address a wider range of ethical complexity but depend on flexibility and coordinated responses from multiple stakeholders (e.g., Gordian knot, Loopy). Each transformation structure provides differing views not only of existing practices that need to be improved to be more ethically-sound, but also opportunities to change these practices in meaningful ways. These results will support design and ethics researchers in describing the ethical awareness, anticipated action, and felt responsibility of technology and design practitioners *on their own terms*.

5.2 A Pattern Library of Transformation Structures May Support New Method Assemblages

The transformation structures we have described provide a frame for identifying not only the types of discrete elements (e.g., methods, actors) that the participants felt were resonant with their work environment that link to potential changes to increase ethical awareness and action, the structures also reveal opportunities where combinations of methods or other supports might be effectively combined in a larger action plan. Design scholars have previously described how methods cannot be viewed in isolation or as existing in an unchangeable form, but rather are performed (Goodman, Stolterman, and Wakkary 2011; Gray 2022) and exist within ecosystems and ecologies (Gericke et al. 2020). This view of methods as ecologies and structures that can be intentionally constructed is in direct alignment with the kinds of structural relationships created by our participants.

The transformation structures we have constructed in this paper may serve as the beginning of a *pattern library* to consider how these combinations of methods and other supports might be intentionally constructed as *method assemblages*. This pattern library could sup-

port both method researchers and design and technology practitioners, identifying opportunities to combine component pieces of ethics-focused supports to increase coherence or address particular types of ethical design complexity in organizations. Building on our context of ethics-focused practices, future scholars might consider how a range of materials might be considered by design and technology practitioners based on purpose, guidelines, mechanics, and outcomes, targeting specific aspects of practice as well as playing independent roles.

These materials in isolation form potential “building blocks” that could then be intentionally combined to meet particular felt needs of practitioners or teams in organizations. The qualities of the resulting method assemblages could be evaluated through the transformation structures we have proposed to identify their purpose and coherence. For instance, a combination of Top-Down and Loopy structures present in a completed assemblage might encourage a practitioner to: 1) create a repetitive practice (from Loopy) to constantly evaluate and propose ethical practice using a Top-Down hierarchy, making it a universal practice to follow certain ethical objectives, and/or 2) forming a generative Loop that connects lower-level subsequent practices to higher-level stakeholders to frame ethical responsibility as a two-way relationship. The component relationships thus benefit from the transformation structures we have proposed and could also serve as a generative input to encourage the creation of certain kinds of assemblages or action plans in the future.

6. Conclusion

In this paper, we describe outcomes from our visual analysis and structural interpretation of 39 action plans generated to address ethical mediation in everyday work by a range of technology and design practitioners. We identified five transformation structures used by the practitioners such as *Parallel Forms* inscribing ethics as a shared or distributed responsibility, *Linear Paths* indicating ethical action is straight-forward and procedural, *Top-Down* inscribing ethical responsibility as an influence-oriented practice, *Loopy* envisioning ethical action as repetitive, and *Gordian* implying the inter-tangled nature of ethical mediation. We identify opportunities for these transformation structures to serve as a pattern library that foster method assemblages, indicating how these structures articulate various perspectives on ethical mediation in technology and design practice.

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