

The Relational Entanglement Diary: A Novel Method for Evaluating Entangled Transmedia Engagement

Framework
conception

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Abstract

Natureculture design involves complex, more-than-human relationships that challenge conventional forms of representation and evaluation. Transmedia experiences offer a way to engage with this complexity through interconnected media, spaces, narratives, and social interactions. Yet, design and HCI research lack methods to evaluate such experiences holistically. This pictorial introduces the Relational Entanglement Diary (RED), a situated mixed-method evaluation tool designed to assess engagement with transmedia journeys as interconnected trajectories rather than isolated interactions. We present the research-through-design process of developing RED, and its deployment across two natureculture sites, each tailored to local contexts and transmedia configurations. Drawing on participant diaries, observational data, and reflective analysis by the research team, we examine how RED captures the relational and transmedia values it aims to reveal. Our discussion suggests RED provides a flexible approach for evaluating complex transmedia experiences and contributes a methodological advancement for design and HCI research focused on relational and more-than-human engagement.

Author keywords

Evaluation methods; Transmedia; Posthuman design; Entanglement HCI

CSS Concepts

Human-centered computing > Human computer interaction (HCI) > HCI design and evaluation methods > Field studies



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Framework
insights

Grounding and Aims

Designing for posthuman engagement remains a central challenge in contemporary HCI [47, 55, 66], as the field increasingly recognizes that humans are part of entangled more-than-human (MtH) worlds — together with ecological systems, technologies, infrastructures, and nonhuman life — requiring a move beyond anthropocentric framings [18, 23, 38]. We propose to engage audiences with MtH perspectives by attempting to represent the complexity of ecosystems, multiple human and other-than-human stories and their entanglements, and inviting the embodiment of other points of view — through interconnected interactive experiences [29]. Within this context, transmedia narratives provide a promising approach for mediating MtH encounters. Transmedia experiences are narrative systems in which a narrative unfolds across multiple media platforms, with each medium contributing distinct and complementary elements to a unified whole [45]. We propose that transmedia journeys are ideal to present the multilayered complexity of MtH entanglements through multi-narrative, open-ended, and multi-modal forms of engagement that invite participants to construct their own relational pathways [29].

However, HCI evaluation methods, normally oriented toward usability, efficiency, and discrete user experiences, naturally struggle to capture such dynamics [22, 27, 47, 66]. Complex interactive experiences, such as transmedia journeys, instead, demand approaches that can account for relationality, situatedness, and the slow accrual of meaning across multiple registers [47, 55], reflecting the layered, emergent character of how people encounter and interpret their entanglements with the various components of the journey. This creates a fundamental methodological gap: while HCI researchers engage with transmedia to communicate MtH entanglement (e.g. [21, 29]), we lack adequate methods for evaluating these complex, cross-platform experiences that unfold across multiple modalities and seek to include situated and social considerations. To address this challenge, we ask how mixed-method evaluation tools can effectively capture and assess participants' engagement with complex transmedia experiences, considering the interconnected and emergent nature of these journeys.

We hypothesize that situated, diary-based methods can surface the multiplicity of registers through which visitors relate to transmedia narratives, revealing both affirmative connections and productive tensions that traditional metrics would

overlook. To test this hypothesis, we introduce the Relational Entanglement Diary (RED), a situated, reflexive method that builds on non-representational approaches [4, 47, 65] to elicit and trace participant transmedia engagement across entangled modalities. The diary integrates multiple evaluation frameworks proposed as flexible modules — scales, open questions, and mappings — specifically formulated for entangled transmedia experiences, presented as a portable and accessible tool.

RED was developed through Research-through-Design (RtD) [37, 78] in order to iteratively improve its design and performance. We conceived RED as part of the wider LoGa Culture EU funded research effort and refined it through piloting it within two transmedia case studies. Situated in a **natural history museum A** (Portugal, N=52) and a **hybrid heritage site B** (UK, N=65), both sites feature natureculture and social dynamics not merely as a backdrop to cultural life but as active, valued agents within it. We analyse and discuss the use of RED through **autobiographical reflections** gathered during researcher's observations in the user studies; autobiographical notes on the design iterations; and two postmortem sessions with both research teams (composed of the authors and additional members from each of the local teams — PT and UK) at the end of the project. Through this process, we demonstrate RED's capacity to capture relational, in-the-moment reflections, sensory impressions, and emotional responses across physical and digital touch points. We also point to tensions and challenges that come with its use.

This research makes three primary contributions. First, we present RED as a novel mixed-method evaluation framework designed specifically for entangled transmedia experiences, highlighting how the RtD process responded to the demands and challenges of the transmedia journeys and implementation contexts. Second, we provide empirical insights from RED's deployments, discussing its effectiveness in capturing nuanced engagement patterns across dialogic, imaginative, embodied, and playful registers. Third, we provide methodological guidance for evaluating entangled systems, contributing to emerging work in natureculture HCI, posthuman interaction design, and situated evaluation practices. Closely connected to C&C26's theme (*Creativity for Change*), these contributions position RED as a reflective, imaginative, and situated evaluation practice that supports design research that engages with the complexity of today's societal, cultural, and environmental challenges.



A



B

Throughout the document, these orange **dialogue boxes** present the **researcher's autobiographical reflections** relevant to the topic at hand. This data was gathered during observations, notes on the design, and two discussion sessions among the research team. In “orange” are the researcher's quotation examples, and in black a summary or insight derived from that point of discussion.

Building on Diary Studies: Format and Structure

Diary studies are a qualitative method that captures users' real-world experiences over time. Its versatility for HCI research, especially for studies in-the-wild [41, 56], has led to recent explorations [54, 58, 77]. Diary studies enable systematic logging of interactions and reflections *in situ*, providing insights that one-off methods, such as lab tests or interviews, are unable to capture. Diary studies can be used to gather data on behavior and perception in natural environments, making them a valuable approach for understanding evolving user experiences [28]. Paper-based diaries, in particular, are valuable for evaluating interactive experiences as they can help reveal rich contextual data on engagement [72].

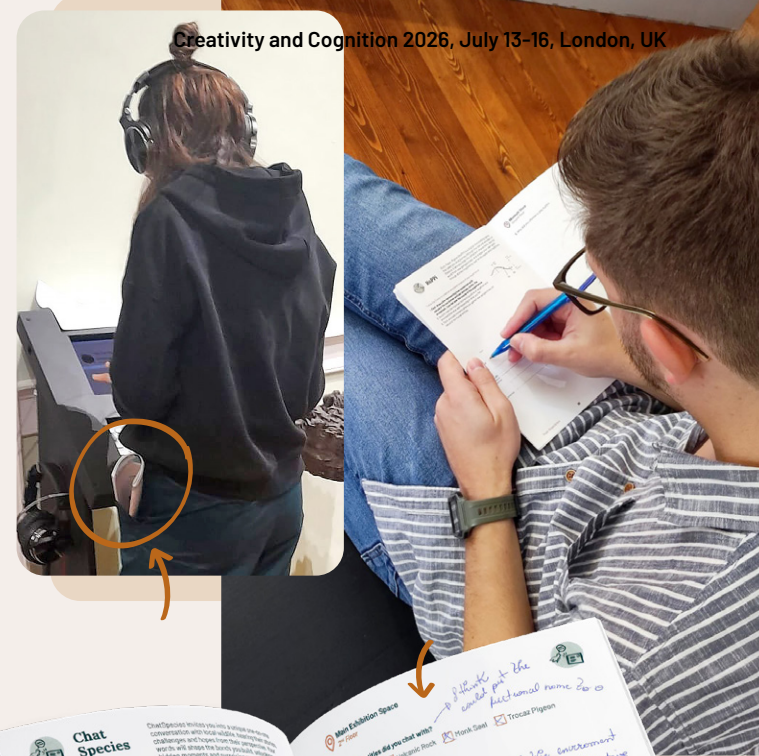
Transmedia are complex interactive experiences. Their evaluation can greatly benefit from approaches that structure participants' feedback across complex interaction sequences, enabling in the moment feedback alongside more holistic reflections. Therefore, RED was designed in a diary format, for its portability and to enable participants to easily document their thoughts and experiences as they interact with the transmedia elements, in a situated manner without researcher interference [15, 64]. RED was conceptualised to allow for participants to move freely within the transmedia journey, replying to each experience section if and when they experienced it. Therefore, we harnessed the diary format to preserve the authenticity of the encounters by maintaining the natural flow of the journey.

As a design research method, booklets have been used in HCI in diverse ways. Annotated portfolios [12] or design workbooks [36] have been proposed as non-prescriptive forms of ideating and communicating design thinking. As research probes, booklets are often employed as mediating tools, facilitating new ways of engaging with participants and discovering insights [10, 30, 35, 57]. For example, this format has been used to co-speculatively imagine alternative futures, harnessing collaboration, partiality, and situatedness [20].

Building on this research, RED brings diary studies, cultural probes and other methods together to create space for the kind of processual reflection that posthuman design demands,

allowing participants time to work through complex emotional, sensory, and conceptual responses that can emerge gradually across transmedia experiences. Its novelty lies in the combination of the structured, longitudinal documentation of diary methods, with the open-ended, generative and reflective qualities of probe-based tools, with the directed inquiry of qualitative evaluation, enabling both systematic evaluation and exploratory engagement with transmedia experiences.

By positioning visitors as active documentarians of their own engagement, RED works towards addressing questions of agency and representation that are central to posthuman evaluation practices. Furthermore, allowing for impressions to be collected through diverse registers – from multiple-choice, to written replies, to sketching – at different moments of the journey – before, during and after – opens the opportunity for varied, personal and immediate responses but also holistic and reflective ones.



"Most participants were able to fill it out comfortably when they could sit down or find a flat surface." Practical and portable on the go.

"It brings a layer of personalization... it forces you into a more personal way of engaging with your answers." Paper diary created personalization and reflective "slowness," potentially deepening engagement.

Evaluating Transmedia Experiences in HCI

Evaluating transmedia experiences is challenging due to their distributed, non-linear nature, which fosters individualized trajectories and cumulative outcomes, making them difficult to assess [18, 19, 21, 29]. Within HCI, evaluation of transmedia experiences commonly employ qualitative methods such as observations, interviews, and artifact collection, sometimes complemented by usage logs or questionnaires to assess engagement and learning outcomes [32, 50, 60, 69]. While these methods capture localized engagement and retention, they rarely address how users navigate between media or experience the story as a whole. In design contexts, evaluations often involve usability testing, heuristic reviews, or early audience feedback to validate design choices [25, 26, 51, 59, 61]. Ethnographic and design-based studies, instead, explore collaborative production, participation, and genre practices [11, 43], or examine spatial and contextual aspects of immersion in hybrid or location-based experiences [5, 6]. These approaches highlight usability, preferences, and other aspects of experience, but generally treat media in isolation. Ghellal et al. [39], on the other hand, evaluates a transmedia journey holistically, treating it as a navigable whole. By combining interviews, GPS tracking, video, observations, and screen capture, they were able to analyse meaning-making both within and across sub-experiences, highlighting how orchestration shapes coherence and flow regardless of participants' chosen paths.

The concept of interactional trajectories has also been explored as a lens to analyze complex journeys as a whole – looking at user experiences unfolding over space and time as orchestrated journeys through hybrid structures involving multiple roles, interfaces, transitions, interactivity, and collaboration [7]. *Trajectories* have been used, for example, to evaluate an interactive museum experience overall journey by reconstructing a “participant emotional trajectory” from in-the-wild logs, self-reports, and interviews [8]; or to map the complex temporal nature of soma design experiences [68].

We build on these works and consider how to systematically account for user agency, social dynamics, possible entanglements (such as more-than-human (MtH) aspects) and interpretive trajectories – an evolving process through which participants construct meaning by progressively interweaving narrative elements with their embodied, situated experience [68, 79]. We contribute to transmedia evaluation research in HCI by proposing a flexible, situated, mixed-methods tool for the holistic evaluation of transmedia experiences – considering the visitor's transmedia journey holistically, as an integrated, cumulative experience. This work highlights the need for diverse approaches capable of capturing the fluid, relational, and multispecies dimensions of posthuman interactions.

Methodological Tensions and Proposals

In recent years, HCI has shifted towards a politically and ethically engaged design paradigm focused on entanglement, values, ontology, and activism [4, 31]. This calls for evaluation methods that are critical and consider the complexity of MtH worldviews [40].

RED integrates situated documentation with reflective analysis [13, 14], working towards tracing how participants navigate complex technological mediations. RED foregrounds difference, situatedness, relational practices, and affective nuance as legitimate and valuable forms of interactive engagement [3, 74].

The method is composed of **four flexible, mix-and-match modules** that can be chosen and adapted depending on the nature of the study, the transmedia experience, and the context of implementation. This modular nature works towards addressing the methodological tensions that arise when designing and assessing complex and entangled engagements.

“[RED] Does a good job in structuring visitors' experience. (...) You still have the freedom to choose where to go and when to go, and then you have a structured part that helps you reflect.”

RED helped structure a transmedia visit while still allowing visitor agency.

The Relational Entanglement Diary method



In the following sections, we present the four modules in detail – how they build on previous research and how they propose addressing the challenges of transmedia evaluation.

Designing RED

Evaluation methods centered on usability, behavioral tracking, and content retention metrics are useful but, when used alone, often fail to capture the depth and nuance of user experiences, especially those that unfold across physical, digital, and ecological layers [13].

Non-representational research, alternatively, moves beyond traditional concerns with representation, meaning, and textual analysis. Drawing on Nigel Thrift's work [70], it emphasizes practice, performance, affect, embodiment, and material relations as central to understanding everyday life. Rather than prescribing a single method, it encourages diverse approaches — interviews, ethnography, art, performance — used creatively to capture life's dynamic, multisensory, and emergent qualities [75]. More specifically, situated evaluation embeds inquiry directly within the experience as it happens. It acknowledges that meaning-making is not static or easily extractable, but emerges through real-time engagement with environments, technologies, and narratives [14, 24, 46]. This is particularly vital in transmedia settings, where elements like spatial sequencing, weather, multisensory cues, and social dynamics shape how people encounter and interpret these experiences.

Module I: Quantitative Measure

To allow for the collection of quantitative data, RED proposes using a metrics-oriented scale before and after engagement with the transmedia journey. The specific quantitative method chosen is dictated by the focus of the transmedia journey and the research being developed. By asking visitors to complete the scale pre- and post-journey, we aim to understand whether there is a shift in participants' engagement with the journey.

The modules also **balance different feedback strategies** that include **A scales**, **B written**, and **C drawing-based replies**. Taken together, the mixed-methods design is particularly valuable for a process as multifaceted as transmedia engagement, as it enables triangulation of subjective narratives with quantitative indicators and highlights both the multiplicity of worldviews expressed and the measurable traces of change across the interactions.

Building on these proposals, the integration of **diverse evaluation approaches** was designed to provide a multi-layered view of transmedia engagement: thematic analysis would reveal the subtleties of participants' lived experiences, while the quantitative section offered a measurable indication of potential shifts in connection to the experiences.

1 Usability

Please indicate how much you agree or disagree with each of the following statements. There are no right or wrong answers. We're simply interested in your own thoughts and feelings.

- I think that I would like to use these interactions frequently.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree
- I found the interactions unnecessarily complex.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree
- I thought the interactions were easy to use.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree
- I think that I would need the support of a technical person to be able to use these interactions.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree
- I found the various functions in these interactions were well integrated.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree
- I thought there was too much inconsistency in these interactions.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree
- I would imagine that most people would learn to use these interactions very quickly.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree
- I found these interactions very cumbersome to use.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree
- I felt very confident using these interactions.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree
- I needed to learn a lot of things before I could get going with these interactions.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree

Seal Exhibit

Critter Chorus

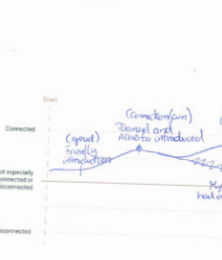
3. How did Critter Chorus shift how you pay attention to nature or the environment?

Critter Chorus

An interactive narrative experience contextualized in Madeira where every voice matters - human, animal, or even the whispering wind. You'll explore stories woven from multiple perspectives, each with their goals and motivations, uncovering the invisible threads that connect us all.

Follow the 3 steps to create an annotated timeline of your experience.

- First, draw a line representing how connected with nature or the non-human entities (animals, rocks, the ecosystem... you felt over the course of this experience.
- Second, mark the important moments (positive or negative) and annotate/draw what was happening or what you felt.
- Third, annotate moments where you gained new perspectives on nature or non-human entities.



B C

Post-Experience

6 How do you engage with nature?

Please indicate how much you agree or disagree with each of the following statements. There are no right or wrong answers. We're simply interested in your own thoughts and feelings.

- My relationship to nature is an important part of who I am.
1- Strongly Disagree ☐ ☐ ☐ ☒ ☐ 5- Strongly Agree
- I always think about how my actions affect the environment.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree
- I enjoy being outdoors, even in unpleasant weather.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree
- I am very aware of environmental issues.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree
- I often feel emotionally connected to natural places.
1- Strongly Disagree ☐ ☐ ☒ ☐ ☐ 5- Strongly Agree
- I take notice of wildlife wherever I am.
1- Strongly Disagree ☐ ☐ ☐ ☒ ☐ 5- Strongly Agree

A

Post-Experience - After journey

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4 Map your journey!

Sketch your journey. Use the stickers to include the experiences you did (number them). Did you do other things between the experiences? Did you go through this transmedia experience by yourself or were you accompanied by others? If so, what is your relationship with them? Please also include if you would change the order and why.



B C

Post-Experience - After journey

24

This example is based on the Nature Relatedness (NR-6) scale [53], detailed on page 9.

Furthermore, the **diverse register types** allows for adaptation to diverse audiences in public settings, as some participants prefer written replies while others feel more comfortable with more restricted (scales) or more open (sketching) methods.

Nuanced and Contextual Insights

Qualitative inquiries are widely used in Human-Computer Interaction (HCI) and design research to capture rich, nuanced, and contextualized insights into user experiences that quantitative measures alone often overlook [1, 48]. Qualitative questions are typically posed as open-ended prompts, allowing participants to articulate their motivations, perceptions, and emotional responses in their own terms [63]. This depth is especially important in transmedia experience evaluation, where users' meanings and interpretations across multiple media components are central to understanding the overall journey. With this in mind, and to complement the quantitative module, RED facilitates the gathering of different forms of qualitative data — through open questions, annotations and sketching.

"Looking at this... I wanted to know why and then, the answer of the qualitative part added context."

The mixed-method layering worked well: visual response raised questions, qualitative text explained why.

"The fact that people reply right after each one of the experiences... it was not difficult for people to remember each experience and give feedback."

Immediate post-experience responses supported recall and specificity across multiple touchpoints.

"The person said no impact."

Tensions and breakdowns were visible, not just positive reporting.



Critter Chorus

C

3. How did Critter Chorus shift how you pay attention to nature or other life forms?

I already knew human interaction affects wildlife's lifestyle, but it's interesting to think how it is from the creature's point of view. To us it's just throwing them food or taking a picture, to them it's getting easy food, affecting their instinct to hunt and scary flashes

4. How much did Critter Chorus make you feel connected to nature?

1. Deeply Disconnected ☐ ☐ ☐ ☐ ☒ 5. Deeply Connected

Why? It's a way to see how human actions affect wildlife. It's simple and short, but still effective

5. What felt new or different compared to what you previously knew?

This one has more human-animal interaction, along with the intention of making the public reflect on those interactions, since it makes the user do the action

Post-Experience

18

Creativity and Cognition 2026, July 13-16, London, UK



6. How would you describe Critter Chorus to someone else?

A more interactive experience that will allow you to see what consequences, good or bad, your actions have

Please ignore the next question if Critter Chorus is the first piece you visited in this interactive experience:

7. How did themes or experiences from other parts of the Biotopia journey shape how you understood or felt about this one?

Previous journeys made me more conscious on the hardships of the wildlife, so it was easier to understand the consequences of my actions here.

LoGa Culture

19

Module II: Qualitative Probing

The open narrative style of the questions allows for self-documentation of **plural ontologies, multiple socially constructed worldviews, and forms of knowledge** [2, 33, 40, 73]. The questions should be adapted to each study's purpose, but simple and accessible language should be used. Also, the number of questions per transmedia component should be carefully considered as not to overwhelm the participant, especially as transmedia journeys can take some time to fully experience. The questions should be designed in a way that allow for the transmedia components to be **experienced in any order**, and some attention should be given to incentivise the articulation of how the different elements connect or relate to each other.

Module II has two sections: one designed to be replied to right **after each transmedia component** and the other to be replied to **after the entire transmedia journey** is completed. The intention is to gather both immediate feedback and a more reflective take after the whole journey.

5 How was your Journey?

How coherent did the various Transmedia elements feel to you?

1 - Fragmented ☐ ☐ ☐ ☐ ☒ 5 - Coherent

In your own words, what was Biotopia's story and core message?

I think the objective is to sensibilise the tourists by connecting them with the island.

What themes or patterns did you notice across the different Biotopia experiences, and which part felt most moving or meaningful to you?

I really liked the images and the peacefulness of the animation.

How did this journey change how you feel about nature and the species you encountered?

For me it was more of a reminder. But I think it could be useful for young ones and people who don't know anything about nature.

Post-Experience - After journey

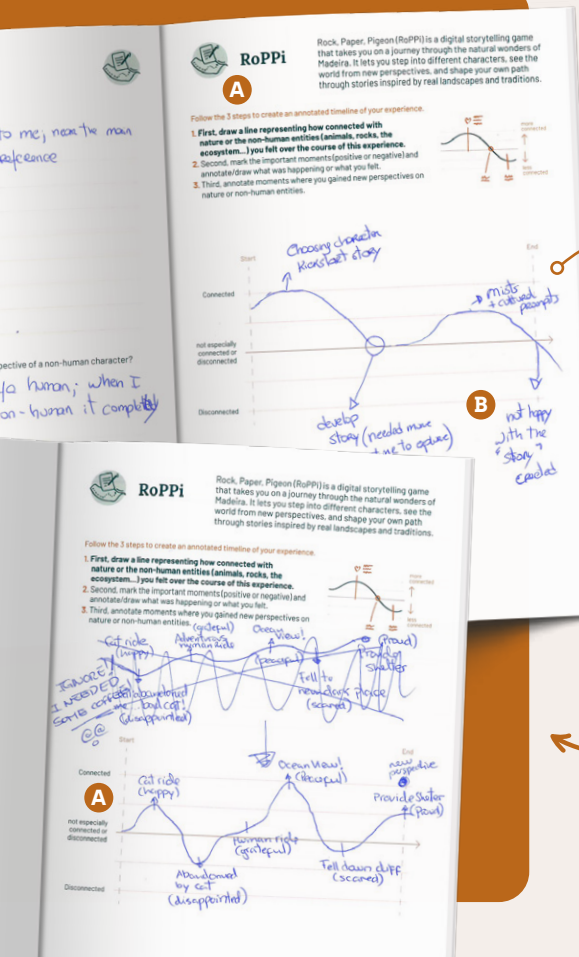
28

Designed for Reflection

Reflective methods complement more analytical evaluation methodologies by inviting participants to articulate their emotional, sensory, and cognitive responses before, during, and after the experience [17]. Techniques such as diaries [64], self-reports [42], and cultural probes [9] allow participants to express how they feel, what they notice, and how their perspectives may have shifted.

Reflection becomes not only a means of assessment but part of the transformative process [29, 34]. As it allows participants to process and narrate their own role in the broader ecology

of the experience, reflexivity often reveals connections or values that would remain invisible through observation or more prescriptive methods alone [3, 16, 76]. Therefore, we propose a module that can complement the questionnaires and/or bring different layers of information about each of the transmedia components, also gathered right after each interaction. In this case, an evaluation section that combines reflection through a visual exercise, supplemented by annotations, with the aim of widening the types of data gathered and allowing the participants to express themselves in various forms.



"It's an output for people to represent their emotions differently, and then again a bit more visual."

The Temporal Fluctuation enabled emotional articulation and made affect visible.

Module III: Temporal Fluctuation

Inspired by the visualization-focused method used in [49] to evaluate changes overtime of presence in VR experiences, we propose a *Temporal Fluctuation* module that would assist in assessing **changes over the course of each individual experience** **A**. The thematic focus of the timeline can be adapted to each study, taking into account that there should be a baseline metric that can go up or down throughout the experience (e.g. connected vs disconnected; immersed vs abstracted; playful vs boring...). This annotated timeline **balances objectivity** – in the focused inquiry imposed – **with openness and subjectivity** **B**, in allowing participants to add annotations and comments at will. This allows for a freer representation of user's perceptions, hopefully pointing to other aspects not shown in the written replies, immediately after each experience.



"The drawing exercises are often more insightful than the comments."

*"The creativity with which
a lot of the maps were drawn
expressed... something else."*

The mapping activity produced more affective or expressive responses than short written answers.

Module IV: Journey Mapping

After the focused interaction with the transmedia elements, we designed a moment of reflection, delivered through a freely creative activity after the complete transmedia journey. This module asks participants to **visually map their journey**, recalling the order they encountered the transmedia components, but also **noting other aspects of the journey** . The prompt of this exercise can point to specific elements that can be added, but it should not be overly prescriptive. For example, it can ask participants to note any activities in between the experiences, the social dynamics of the visit, or to reflect on whether they would change the order of their visit and why.

This sketch-like mapping activity was designed to capture participants' holistic experience, reflective interpretations, and affective responses **D** in a freer and more creative format.

A Tool for Introspection and Self-Expression

Sketching is a prime method for mediating reflection, offering a space for externalizing thinking [62], and supporting memory, inference, and creative discovery [67]. Through RED, participants are invited to respond to their sensory environment, to speculate about the intentions behind the experience, and to assess how their own awareness has changed. By combining real-time documentation with post-experience reflection, the diary offers a holistic and participant-centered approach to evaluating transmedia engagement.

RED's Research-through-Design Phases

RED was developed through an iterative RtD process that included two versions of the method – RED-Bio and RED-Ages – corresponding to two transmedia journeys: *Biotopia* and *Ages of Avebury*. The two versions were designed and improved through several testing phases. This page presents the RtD journey of RED, briefly illustrating each phase and what was edited and added in each step of the design process.

1 Framework Conception

The first version of RED was conceptualised to allow for the gathering of diverse types of data, hence the choice of quantitative tools (**Module I: Quantitative Measure**), qualitative open-questions after each experience and at the end of the journey (**Module II: Qualitative Probing**), and a more creative mapping activity (**Module IV: Journey Mapping**).

2 RED 1st version: RED-Bio v1

The initial framework was used for evaluating the *Biotopia* transmedia experience (details of this design in page 9).

3 Pilot Study 2: *Biotopia* Pilot 2

The refined version was piloted again in the museum by three researchers and five experts from diverse fields of knowledge, including HCI, Visual Communication, Design, Psychology, and Sustainability.

4 Pilot Study 1: *Biotopia* Pilot 1

The first iteration of RED was piloted by two researchers of the project team on location, at the Funchal Natural History Museum. We assessed the flow of the diary phases, and visitors' trajectory through the museum as well as the length of the evaluation process.

5 RED 2nd version: RED-Bio v2

Flow and length of the booklet were adjusted by reorganizing and rephrasing some of the questions. Functionality of the booklet was improved (e.g., adding page numbers and a map of the museum, its format, and general informative pages).

6 RED 3rd version: RED-Bio v3

The second pilot-study highlighted the need to balance the depth and length of the evaluation with participants' availability and attention span. The number of questions was reduced, and the informative pages were more clearly illustrated, adding recurring and illustrative icons. The path through the museum and diary was strengthened through visual and physical markers guiding visitors in the museum space.

7 RED 4th and 5th versions: RED-Bio v4 and RED-Ages v1

Results from RED-Bio v1 showed the potential of the freer, sketch-based mapping module, while also revealing the limited value of the quantitative scale. In response, we introduced a new post-experience module – **Module III: Temporal Fluctuation** – designed to gather additional data through more personal and emotional responses. The other modules remained largely unchanged, with minor question edits and added details to the museum map, resulting in RED-Bio v2.

We also developed RED-Ages v1 to evaluate the *Ages of Avebury* transmedia journey, with a focus on social dynamics within the broader site visit (detailed on page 10). To avoid overemphasizing digital elements, this version used an adapted **Module II: Qualitative Probing** and **Module IV: Journey Mapping** to capture visitors' perceptions of the overall social journey.

8 Main Study 2 and 3: *Biotopia* Study 2 (N=24) and *Ages of Avebury* Study 1 (N=65)

The second *Biotopia* study followed up on the initial evaluation, continuing to assess the museum intervention's sustainability and transferability **B**. It also tested RED's reliability across repeated uses, focusing on relational, affective, and ecological aspects of visitor engagement.

Ages of Avebury Study 1 examined how mixed reality technologies enhance engagement in complex heritage settings. Conducted at Avebury **C**, it took a holistic, context-sensitive approach to explore how digital experiences interact with the site's physical and social dynamics, emphasizing the cumulative impact of these interactions on visitor understanding.

10

Final Takeaways

After the in-the-field implementations of both RED versions, post mortem sessions with both research teams (PT and UK) were conducted, to discuss what worked, what could be improved and why, and take lessons for future research. The results of these sessions are presented in pages 9 to 11, and inform the discussion in page 12.

9

8

7

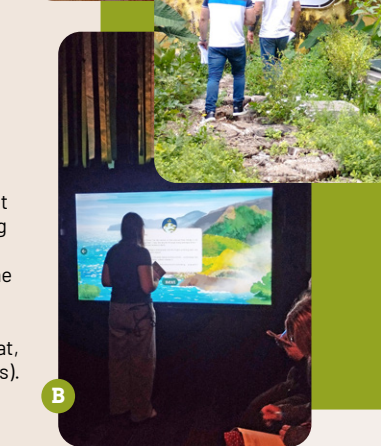
6

5

3

2

1



2 How do you engage with nature?

Please indicate how much you agree or disagree with each of the following statements. There are no right or wrong answers. We're simply interested in your own thoughts and feelings.

1. My relationship to nature is an important part of who I am.
1-Strongly Disagree ☐ ☐ ☐ ☒ ☐ 5-Strongly Agree
 2. I always think about how my actions affect the environment.
1-Strongly Disagree ☐ ☒ ☐ ☐ 5-Strongly Agree
 3. I enjoy being outdoors, even in unpleasant weather.
1-Strongly Disagree ☐ ☐ ☒ ☐ 5-Strongly Agree
 4. I am very aware of environmental issues.
1-Strongly Disagree ☐ ☐ ☒ ☐ 5-Strongly Agree
 5. I often feel emotionally connected to natural places.
1-Strongly Disagree ☐ ☐ ☒ ☐ 5-Strongly Agree
 6. I take notice of wildlife wherever I am.
1-Strongly Disagree ☐ ☐ ☒ ☐ 5-Strongly Agree
- Anything else that you'd like to add?

I think because of my lifestyle, I do not do so many dead like animals, because I already do my part to contribute to sustainable behaviors.

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Module I: Quantitative Measures

For this version of RED, we used a pre and post quantitative sections based on the **Nature Relatedness [NR-6] scale** [53], a psychometrically validated six-item version of the NR scale [52], which captures individual idiosyncrasies in engagement with the natural world. The scale assesses visitors' changes in their relationship to nature, and so it could bring a valuable layer to understanding shifts in visitors' connection to nature influenced by the engagement with the MtH-focused transmedia journey.



RED-Bio Evaluating the Biotopia transmedia journey in Madeira, PT

Biotopia is a MtH heritage transmedia journey designed and implemented in Madeira, an island recognized as one of Europe's biodiversity hotspots, where ecological richness coexists with a strong economic dependence on tourism. Developed by an interdisciplinary team in collaboration with local partners, Biotopia was designed not to deliver fixed solutions for MtH heritage engagement, but to explore how situated, ecologically attuned experiences can foster more inclusive and sustainable design futures.

Hosted across the Funchal Natural History Museum and its garden, Biotopia invites visitors into multispecies encounters through four interconnected experiences: 1) an Immersive Narrative that gives human and nonhuman agents equal narrative presence and lets visitors witness the ecosystemic consequences of their choices; 2) a screen-free Sensory Bracelet that supports nature walks through tactile cues and animal calls when entering species "contact zones"; 3) an AI-enhanced Chat Interface enabling reflective conversations with taxidermied specimens from the collection; and 4) a hybrid Storytelling Game that encourages players to embody local human and nonhuman entities through speculative, character-driven narratives. Together, these experiences create a layered exploration of human-nature relations, with the aim of exploring MtH heritage representation and engagement, and opening dialogue on endemic and invasive species, colonial legacies, interspecies ethics, and ecological empathy.

RED-Bio used all four RED modules, adapting them to the specific needs of the Biotopia experience and the study's aim.

Module II: Qualitative Probing

The open-ended questions guided visitors to reflect on each of the four transmedia components. We designed the questions so the components could be experienced in any order, and we asked visitors to articulate their opinions on **how the different elements connected, their interpretations of the story and message, and aspects related to the purpose of each experience.**

The "after the journey" questions focused on understanding visitors' perceptions of the overall narrative (transversal to all four experiences), the message, and nature-engagement strategies.



"People say, oh... I enjoyed learning this about the seal and then in the other one... this other bit about seal."

Species knowledge and meaning travelled across touchpoints.



"The method that we have allowed for different layers of things to appear."

The multi-module setup supports entanglement as "relational interpretation" rather than a single metric.

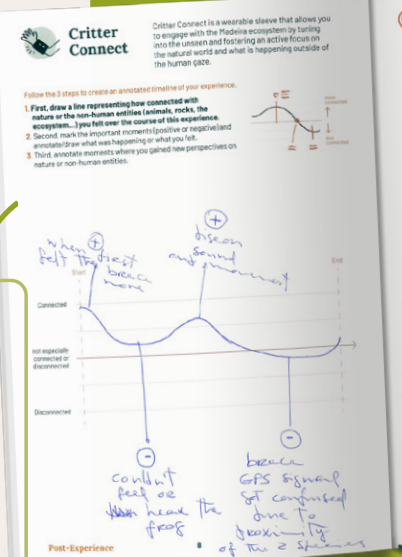
Module III: Temporal Fluctuation

For RED-Bio, the Temporal Fluctuation assessed how **connected or disconnected** visitors felt in each individual experience, with a focus on the themes explored. Participants were asked to draw a line representing their connection to nature or other-than-human entities throughout the experience, mark important moments with annotations or drawings reflecting their feelings, and highlight instances in which they gained new perspectives on nature or other-than-human entities.



Module IV: Journey Mapping

For this mapping activity, visitors were asked to sketch their journey, representing the **experiences they encountered** in the order they encountered them, noting any additional activities, whether they participated alone or with others, their relationship with any companions, and whether they would change the order and why. The focus here was to allow participants to reflect on their journey and freely add the elements that were important to them or that came more readily to mind. For RED-Bio, besides sketching materials, we also made available stickers representing each of the four interactive transmedia experiences, to help with mapping the journey.



"We have designed the pre and after right, what did you visit before, and what did you visit after, exactly to connect the trajectory."

Explicitly prompted sequencing and connections, making trajectories legible.



Museum Garden Ground floor

1. What made you want to try Criter Connect?

the fact that I could experience the beach and what it would make me feel.

2. How did Criter Connect change how you noticed your body, senses, or the world around you?

It was funny to feel the legs walking on my own, but it was exactly that the sensations would be stronger. It was interesting to begin feeling the heat and then hear the sounds. I think that the beach should be more sensitive.

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4 Map your journey!

Sketch your journey. Use the stickers to include the experiences you did (Criter Connect, ChatSpecies, Criter Chorus, RoPi) and the order you followed (number them). Did you do other things between the experiences? Did you go through this transmedia experience by yourself or were you accompanied by others? If so, what is your relationship with them? Please also include if you would change the order and why.



Post-Experience - After journey

List of activities at Avebury

- Walk around the stone circle
- Play Ages of Avebury mobile game
- Visit St James's Church
- Visit the shops (National Trust shop, Bookshop, Henge Shop, Elements of Avebury)
- Visit another nearby Neolithic site (the West Kennet Avenue, West Kennet Long Barrow, Silbury Hill, the Sanctuary, Windmill Hill)
- Go to the Red Lion pub or the National Trust cafe
- Visit the Alexander Keiller Museum
- Visit the Visitor Center Barn
- Explore Avebury Manor Gardens
- Make a milkshake with the milk robot

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It's really complex. There's lots of stuff going on there."

"Rather than have a booklet with a fixed set of activities... to have a booklet where there is an open set of activities."

RED-Ages supports entanglement-as-ecology: the site is treated as a mesh of heritage, commerce, institutions, tourism, and public access.

Module II: Qualitative Probing

The qualitative questions were designed to assess **which activities visitors choose to do and why**, and **how their choices and the journey's order affect their experience of the site**. The structure of the section was adapted to allow for freedom of choice and unpredictability, also in what is accounted for as "activities". At the start of this section, a list of possible activities is presented as examples of what visitors could choose to do, but it is not limited to these examples. Then, the activity's sub-sections follow the same structure, so they can be used to reply to the questions as related to any activity, in any order.

The *Qualitative Probing* section, after the completion of the transmedia journey, focused on a better understanding of **visitors' perceptions of the heritage site's genius loci** (or "spirit of place"). Questions were formulated to assess this topic.

Genius loci

Genius loci is a Latin term meaning 'spirit of place'. It broadly refers to the essence or character of a locale, whether material or spiritual, and its distinctive qualities.

What was your experience of place at Avebury?

It was a super cute village that feels like its purpose and spirit comes from around the stones.

Were there any ways in which the game impacted your sense of place at the site?

The game helped me realise the past history of the place and recognise some of the paganism and myths surrounding it.

RED-Ages

Evaluating the Ages of Avebury transmedia journey in Avebury, UK

Ages of Avebury is a transmedia experience that begins by inviting visitors to take on the role of a surveyor tasked with mapping the ancient monument. However, their mission quickly takes an unexpected turn: as they explore the landscape, their devices begin to transform, and they find themselves drawn into earlier eras of Avebury's past. In these moments of temporal dislocation, players collaborate – across times and with other visitors – to create their own augmented reality stones, gradually rebuilding the prehistoric circle together. What starts as a simple survey becomes a playful act of time travel and co-creation, allowing participants to experience Avebury as both discoverers and makers of its evolving history.

The experience is implemented at the Avebury Stone Circle, part of the Stonehenge and Avebury World Heritage Site in Wiltshire, UK, a richly layered prehistoric landscape. At its centre, the monumental henge encloses the world's largest stone circle, framed by a vast earthwork and containing two additional megalithic rings. While the landscape retains a powerful sense of antiquity, much of its richness has been obscured by time, making Avebury a compelling setting for a narrative experience that reconnects visitors with its hidden histories.

This study investigated how mixed reality technologies can meaningfully enhance engagement within complex heritage environments by examining their use *in situ*, as part of visitors' unfolding encounters with place. Our particular focus at Avebury was on how to introduce modern technologies within an ancient context in a sympathetic and respectful way, ensuring that they did not feel anachronistic, but instead deepened the site's atmosphere and preserved its distinctive spirit. The research adopts a holistic, context-sensitive approach that considers how locative, augmented, and tangible experiences intersect with the spatial, cultural, and social dynamics of Avebury.

RED-Ages uses two RED modules:
Module II: Qualitative Probing and
Module IV: Journey Mapping.

Module IV:
Journey Mapping

The mapping section followed a very similar approach to RED-Bio's, with only minor edits to the description text to focus more closely on the **visit's social dynamics**.

"Let's not think about our bit as the transmedia experience, let's think about the whole site as the transmedia experience."

RED-Ages reframed transmedia from "our digital intervention" to "the entire heritage site journey," capturing the entangled sequencing of site activities + digital.

*"A lot of the Diaries mention social elements."
"They talk about going around with friends or meeting up with people."
Sociality emerged strongly in the diaries.*

The post-mortem sessions and the researcher's notes from the implementations also identified several tensions. In the following, we present the issues raised and insights for future work.

Tensions

→ Structured Guidance vs Ecological Openness

RED-Bio

- Highly structured evaluation.
- Clear list of required transmedia experiences.
- Strong capture of relational trajectories between designed pieces.
- Limited attention to broader environmental context.

RED-Ages

- Open exploration across entire site ecosystem.
- Participants define activities themselves.
- Rich contextual data but less consistent engagement with target intervention.

→ Transmedia as Bounded System vs Transmedia as Ecological Assemblage

RED-Bio

- Transmedia defined as a specific designed journey.
- Evaluation captures cumulative narrative meaning across pieces.

RED-Ages

- Transmedia expanded to include entire site ecology (tourism, heritage, social practices).
- Digital intervention becomes just one element within a broader assemblage.

→ Measuring Relationality vs Eliciting Relational Reflection

Both deployments attempted to capture relational dynamics and highlighted similar shortcomings:

RED-Bio

Participants were successfully guided through the relational dynamics within the transmedia, but failed to connect with the museum context and the rest of its offerings.

RED-Ages

Participants valued the open-ended exploration of the surroundings—including places like the pub, visitor centre, and cafeteria—but this fuzziness led them to miss key transmedia elements (locative games and interactive narrative) and aspects of the site's archaeological richness.

→ Temporal Modes of Reflection: Immediacy vs Retrospective Meaning-making

Both cases reveal two complementary but conflicting temporal layers:

RED-Bio

Immediate reflection

- Captures sensory impressions.
- Sometimes shallow or perfunctory.
- Can interrupt the flow of the journey.

RED-Ages

Retrospective reflection

- Captures meaning and connections.
- Can be richer in insights.
- Less precise temporally.

→ Visual methods as emergent strengths of RED

RED-Bio

Across **both deployments**:

- Drawings/maps often revealed more relational understanding than text.
- Participation increased when drawing was normalized.

RED-Ages

Insights

Balancing Structure and Openness: Balance control (needed for focused evaluation) and openness (needed to capture situated transmedia experience)

RED is not neutral – its structure actively shapes what becomes visible in evaluation. RED does not simply capture experience but actively shapes it, meaning that evaluation structure must be intentionally tuned to either foreground designed trajectories or reveal emergent contextual relationships.

Defining System Boundaries: Where does the "transmedia system" begin and end?

Treating either a discrete set of interventions or an entire environment as the transmedia system fundamentally alters what counts as data, shifting RED from evaluating designed artefacts to examining socio-spatial assemblages.

Capturing Relationality: Relationality is easier to infer analytically than to capture through direct questioning.

Rather than emerging through explicit reflective prompts, relational understanding tends to surface indirectly through cumulative activities, suggesting that RED's analytical strength lies in assembling connections across responses rather than asking participants to articulate them directly.

Temporal Complementarity: RED works best when both modes coexist rather than compete.

Immediate, in-situ reflections capture affective and sensory traces of experience, while retrospective activities support synthesis and meaning-making. This indicates that RED should deliberately scaffold multiple temporal layers of reflection to balance experiential immediacy and interpretive depth.

Centrality of Visual Methods: Visual elicitation is a central (not auxiliary) component of RED.

Mapping and drawing activities revealed relational structures, affective responses, and spatial trajectories that were absent or underdeveloped in textual answers, positioning visual elicitation as a primary mechanism for accessing experiential complexity.

RED's methodological contribution lies in enabling researchers to intentionally position themselves along a spectrum of structured and open configurations, suggesting that RED's flexibility is both its primary strength and a source of methodological trade-offs. Future applications of RED should therefore explicitly position themselves along this spectrum, aligning methodological structure with research aims.

RED as a Configurable Framework for Situated Transmedia Evaluation

RED becomes a configurable evaluation framework whose epistemic outcomes depend on **how boundaries between experience, context, and participant agency are defined**. This positions RED as both an evaluative tool and a reflexive design instrument.



Discussion

Our comparative reflection on RED-Bio and RED-Ages shows that evaluating transmedia experiences as *entangled systems* requires methodological decisions that go beyond selecting “appropriate methods” and instead attend to how a transmedia journey, like other complex interactive experiences, is produced through place, timing, and relations [7, 39]. While both versions of RED successfully captured trajectories across multiple touchpoints, they did so through two distinct models. RED-Bio operationalised the transmedia experience as a curated set of designed components embedded in a museum visit, making it effective for ensuring coverage of the intervention and for tracing how meaning accrued across individual experiences. RED-Ages, in contrast, treated the wider heritage site as the transmedia experience, foregrounding the way digital interactions become interwoven with tourism, infrastructure, commerce, and social routines. This shift proved valuable for situated evaluation in complex, living sites [33, 47, 55], but also introduced analytic challenges by generating large volumes of “context” data that were not always directly related to the designed digital elements. In natureculture HCI and posthuman design [18, 65, 66], this contrast highlights a central tension: entanglement is often best observed at the scale of site ecology, yet design research often needs to retain a focus on specific interventions. RED’s modular structure is therefore best understood as enabling deliberate choices about *where to draw the boundary* of the “experience” being evaluated.

A key methodological implication is the need to balance openness with minimum structure. RED-Ages demonstrated that leaving trajectories fully open can risk participants by-passing core digital components, while RED-Bio showed that tightly structuring engagement around intervention elements can inadvertently obscure other relations that shape experience (e.g., exhibitions, ambient site rhythms, or incidental encounters). Future instantiations can address this by explicitly separating a “minimum required path” (ensuring that key touchpoints are encountered) from an “ecological layer” that invites participants to document emergent activities, detours, and contextual influences. This preserves RED’s capacity to adapt to place [13, 14] while still supporting robust interpretation of transmedia coherence and contribution. Importantly, this points to RED emerging as a configurable framework for situated transmedia evaluation, whose epistemic outcomes

depend on how boundaries between experience, context, and participant agency are defined.

Across both studies, we also observed that relationality is not reliably captured through direct causality prompts. Questions such as how one activity “impacted” the next were often difficult for participants to answer in situ, particularly in open sites where activities are varied, self-directed, and socially mediated. Instead, relational dynamics were more effectively captured when RED enabled participants to narrate connections indirectly (e.g., what stood out, what carried over, what felt different after doing something else), allowing researchers to infer relational patterns without forcing participants into explicit causal reasoning. This is particularly important for evaluating entangled transmedia systems, where relations are not always experienced as linear cause-and-effect, but as gradual shifts in attention, interpretation, and orientation across registers [8, 39].

Our findings further suggest that RED benefits from a two-phase reflection architecture. In-the-moment responses can preserve affective and sensory impressions at specific touchpoints, while end-of-journey activities support slower, integrative sensemaking about the trajectory as a whole. Importantly, these phases should not be conflated: reflective questions embedded “mid-journey” may be hastily replied to, whereas synthesis prompts at the end can better support participants in articulating cross-experience connections. This layered temporal design is especially relevant for posthuman and natureculture evaluation, where engagement may involve subtle attunements to environments, atmospheres, and MtH narratives [44, 71] that are not immediately expressible in conventional written feedback.

Finally, our comparison reinforces the value of visual and diagrammatic modules beyond mere optional creative additions. In both versions, mapping and drawing often surfaced qualities of experience that written responses did not, or added layers of meaning to them, including affective tone, spatial emphasis, and what participants considered salient enough to represent. However, uptake depends on careful framing: small changes in instructions (e.g., explicitly welcoming simple sketches and non-artistic representations) can significantly reduce intimidation and increase participation. For methodological work in posthuman interaction design, this supports

a view of visual elicitation as a practical way to capture relational impressions [29, 47] and emergent entanglements [21, 34] that resist propositional description. Therefore, while RED enables rich, situated accounts of transmedia engagement, it also introduces challenges related to participant burden and uneven data quality, particularly in open-ended configurations where engagement levels and interpretation vary significantly across participants.

Taken together, RED-Bio and RED-Ages demonstrate that evaluating entangled transmedia systems requires methodological attentiveness to (1) how the experience boundary is defined (intervention vs site ecology), (2) how openness is scaffolded to retain analytic focus, and (3) how temporal layers of reflection and visual elicitation are orchestrated to support both immediacy and synthesis.

Conclusion

This pictorial has introduced the Relational Entanglement Diary (RED) as a situated, flexible approach for evaluating transmedia experiences understood as relational, entangled trajectories rather than discrete interactions. Through the comparative deployment of RED-Bio and RED-Ages, we have shown how methodological choices around experience boundaries, degrees of openness, temporal structuring of reflection, and the use of visual elicitation critically shape what kinds of relations become visible in evaluation. Rather than offering a single prescriptive method, RED operates as a modular framework that supports deliberate, context-sensitive decisions about how to balance ecological attentiveness with analytic focus. In doing so, RED contributes a practical methodological advancement for design and HCI research engaging with natureculture, posthuman, and MtH concerns, where meaning emerges across media, places, and relations that resist linear or purely causal accounts.

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