





# Designing Multispecies Futures Through Speculative Fiction and Interactive Narratives

Nour Boulahcen<sup>(✉)</sup>  and Gareth W. Young 

Trinity College Dublin, Dublin, Ireland  
{boulahcn,Gareth.Young}@tcd.ie

**Abstract.** The stories we tell about the future shape our collective imagination of technology, ecology, and multispecies coexistence. Here we present a design research pipeline that operationalizes thematic insights from speculative fiction to create interactive digital narratives (IDNs) for exploring humanplantcomputer futures. Using a corpus of ten science-fiction works, we conducted a thematic analysis to identify recurring patterns in plant representation, interaction types, functional roles, and ethical themes. These insights informed a structured ideation process, storyworld design, and low-fidelity prototyping of interactive concepts, culminating in an augmented tabletop role-playing game that integrates VR immersion and AR-based plant interaction. This reproducible pipeline establishes a novel pathway for designing IDN systems directly from speculative narratives, enabling the creation of interactive artefacts that embed multispecies ethics and ecological storytelling into their core design.

**Keywords:** Speculative Fiction · Interactive Digital Narratives (IDN) · Human-Plant-Computer Interaction (HPCI) · Design Methods

## 1 Introduction

Humanity faces an accelerating ecological crisis, an unrelenting race toward digital saturation, and a gradual disappearance of nature from everyday life. These pressures exacerbate what is termed “*plant blindness*”, the tendency to overlook plants’ ecological and cultural significance [30]. Contemporary visions of the future often polarize between techno-solutionist fantasies of planetary colonization and dystopian narratives of collapse. In this context, the stories we tell about tomorrow shape what societies consider possible, desirable, and inevitable.

Recent work in speculative design, Afrofuturism, and Indigenous Futurisms argues for moving beyond linear, anthropocentric models of progress [8]. These frameworks invite futures grounded in situated knowledge, cultural plurality, and nonhuman agency [12, 32]. Plants, often relegated to background scenery in mainstream storytelling, challenge dominant epistemologies. Operating on different timescales, modes of communication, and logics of care, they prompt us

to reconsider assumptions about intelligence, collaboration, and design [14,22]. Re-centering plants within speculative narratives opens new space to critique extractivism, enclosure, and technological determinism, while imagining ecological kinships and co-design practices that embrace interdependence and multispecies futures [18,29].

Moreover, speculative fiction has long served such purposes: more than entertainment, it operates as a medium for ethical reflection, ecological critique, and world-making. In parallel, *Interactive Digital Narratives* (IDNs) increasingly provide interactive storyworlds where agency, responsibility, and ethics can be explored [7,10,11,33]. We situate our work at the intersection of speculative fiction and IDN design through the emerging field of *Human-Plant-Computer Interaction* (HPCI). HPCI examines how computational systems mediate relationships between humans and plants, treating vegetation as active participants in socio-technical systems rather than passive backgrounds.

This intersection leads us to our guiding research question:

- *How can thematic analysis of speculative fiction inform the design of interactive digital narratives that explore human-plant-computer interaction futures?*

To address this question, we present a design-research approach that translates themes from speculative fiction into interactive artefacts. By systematically analyzing ten books, films, and television series where plants play central narrative roles, we identified recurring patterns in representation, interaction types, functional roles, and themes. These findings informed the ideation and prototyping of interactive concepts, culminating in an augmented tabletop role-playing game (TTRPG) that combines VR immersion with AR plant interaction to explore ethical dilemmas and symbiotic futures.

## 2 Related Works

### 2.1 Speculative Fiction (SF) in Design Research

Speculative fiction has become a key method in design research for exploring alternative socio-technical futures. Rather than predicting technological developments, SF helps surface ethical dilemmas and provoke “what-if” thinking in situated contexts [16,20]. It is widely used in strategic foresight and futures studies, often integrated with workshops, participatory design, and ethnography to test visionary ideas without falling into deterministic innovation narratives [1,2]. Short forms like consumer flash fiction also support rapid sensing of emerging desires for far-future scenarios [31].

Although critics argue SF cannot predict specific futures [21], its value lies in examining systemic effects of technology [15] and engaging publics in debates about democratic life and technological change [23]. Within this paper, SF is not treated as a predictive tool but as a generative resource for designing, providing thematic material that can be operationalized in the creation of interactive systems.

## 2.2 Interactive Digital Narrative (IDN) Design Processes

Research on IDN has primarily focused on analyzing complicated artefacts, leaving the design process itself under-described [27]. Recent frameworks emphasize design and creativity as overlapping, iterative practices [25, 27]. Typically, IDN design is framed as cycles of divergent and contrasting thinking [26], moving through ideation, meaning-making, interactive design, validation, and distribution [25].

This evolving process situates IDN design as a dynamic interplay of system, process, and product (SPP model), producing artefacts that are adaptive, participatory, and contextually meaningful. However, existing frameworks rarely integrate ecological or multispecies perspectives, nor do they systematically incorporate speculative fiction as a design input. Our work extends these foundations by proposing a pipeline that translates thematic analysis of speculative fiction into IDN design, bridging narrative theory, ecological storytelling, and HPCI.

## 2.3 Human-Plant-Computer Interaction (HPCI)

HPCI extends Human-Computer Interaction (HCI) by recognising plants as active participants in hybrid socio-technical systems. Work in this area highlights how vegetation operates on different timescales, modes of communication, and logics of care, challenging human-centric assumptions about intelligence and design [14, 22]. Scholars have further emphasized the need to reimagine society through ecological kinships and interdependence [18, 29], suggesting that interactive systems can help combat plant blindness and foster empathy for more-than-human life.

Despite these calls, HPCI research remains conceptually rich but methodologically underdeveloped. Few approaches connect speculative fiction with interactive system design, leaving a gap for design frameworks that translate narrative imaginaries into interactive artefacts. Our work addresses this by proposing a pipeline that bridges speculative fiction, IDN design, and HPCI, foregrounding ecological storytelling and multispecies ethics in interactive narrative research.

## 2.4 Research Gap

Taken together, these three domains provide complementary perspectives on narrative, design, and ecological futures. Table 1 summarizes their respective foci, standard methods, and limitations. This comparison highlights the research gap our work aims to address: while SF offers thematic richness, IDN provides interactive structures, and HPCI foregrounds multispecies relationships, there is still no systematic pipeline connecting these strands into a reproducible design process. In the following section, we respond to this gap by presenting a design research pipeline that translates thematic analysis of speculative fiction into interactive digital narratives, extending existing IDN frameworks with multispecies perspectives from HPCI.

**Table 1.** Comparison of related fields and their limitations

Domain	Focus	Common Methods	Limitations
SF	Imagining alternative socio-technical and ecological futures	Narrative world-building, thematic exploration, workshops, foresight exercises [1, 2, 16]	Not predictive; often detached from design practice [15, 21]
IDN	Designing adaptive, participatory storyworlds	Iterative design, prototyping, systemprocessproduct models [25–27]	Creation processes under-described; limited integration of ecological or multispecies perspectives
HPCI	Treating plants as active participants in socio-technical systems	Speculative design, ecological critique, experimental prototypes [14, 18, 22, 29]	Conceptually rich but methodologically underdeveloped; few pipelines linking narratives to system design

### 3 Methodology

This study extends the IDN design process described by Serbanescu and Koenitz [27] by introducing a pipeline that generates design artefacts from speculative fiction. The pipeline combines thematic analysis, structured ideation, and low-fidelity prototyping across four phases: (1) thematic analysis (corpus and codebook development), (2) structured ideation, (3) concept development, and (4) prototyping.

#### 3.1 Thematic Analysis

We began with a corpus of ten novels, films, and television series where plants play a central narrative or symbolic role (Fig. 1). Each work was examined through memo-writing, documenting humanplant interactions, technological mediation, ecological symbolism, and ethical tensions (Fig. 2). Following Braun and Clarke’s six-phase framework, memos were iteratively coded and consolidated into a codebook of 34 themes across four categories: Representation, Interaction Types, Functional Roles, and Themes Explored (Fig. 3).

#### 3.2 Structured Ideation

Building on the thematic analysis, the next phase focused on generating design concepts through a structured ideation process. This stage employed an adapted



**Fig. 1.** Illustrations of the different media from the corpus (1: Scavenger Reign [3]; 2: The Greenhouse at the End of the World [6]; 3: Nausicaä [24]; 4: Pumzi [17]; 5: Wall-E [28]; 6: La Trame [5]; 7: Avatar [4]; 8: Mars Trilogy [9]; 9: Day of the Triffids [13])



**Fig. 2.** Sample thematic analysis memos for the corpus

card-sorting method in which designers worked with multiple boards, each containing cards that represented themes, tools, methods, or concepts. By combining and arranging these cards on a central workspace, designers were able to iteratively explore possible configurations and requirements for new designs.

The inputs for this process included the final codebook and memo notes from the corpus analysis. To support a multidimensional exploration, three complementary boards were developed: a technology board, mapping potential components and interaction modalities (e.g., XR, AI agents, IoT sensors, haptics); a storytelling board, outlining narrative forms (e.g., branching structures, sandbox storytelling) and storytelling methods (e.g., TTRPG, alternate reality games, social media narratives); and an HPCI modalities board, describing plant-related

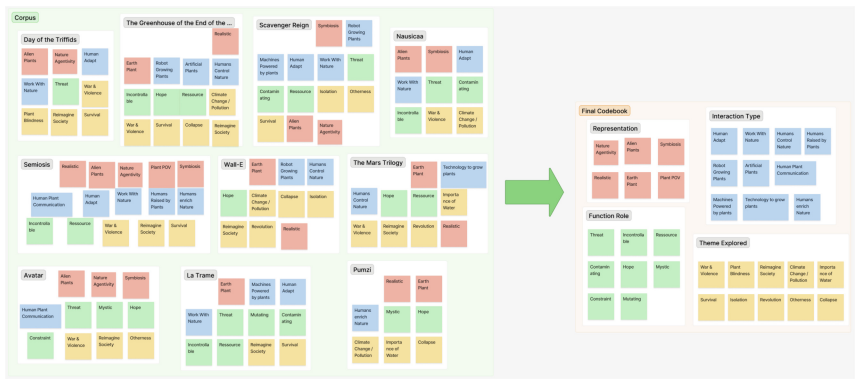


Fig. 3. Thematic analysis codebook development

interaction dimensions such as care, growth, slow temporality, bioluminescence, and chemical signaling (Fig. 4).

By combining elements across these four dimensions (theme, technology, narrative form, and plant interaction modality), designers produced a consolidated ideation board (Fig. 5), which served as the foundation for the subsequent storyworld development.

3.3 Storyworld Development

The ideation outputs were then translated into a structured narrative framework through the development of the storyworld. An initial canvas was created that integrated external inspirations (such as the Babel TTRPG), together with narrative anchors and conceptual elements defining the broad structure of the interactive experience (Fig. 6).

To extend and refine this framework, generative AI was employed as a creative support tool. Rather than replacing human authorship, AI was used to generate alternative scenario structures, enrich character backstories, and produce diverse sets of non-player characters (NPCs) that could populate the environment [19, 27]. This process enabled rapid iteration and the exploration of multiple narrative trajectories, which could subsequently be evaluated and refined in collaboration with domain experts, such as experienced game masters.

3.4 Concept Development

The concept development phase focused on refining the narrative and interaction models established during the ideation and storyworld development stages. The HPCI triangle was employed as a structured framework to map relationships and interaction pathways between humans, plants, and computational systems. This facilitated the systematic identification of key actors, their roles, and the possible forms of interaction that could emerge within the envisioned experience.



Fig. 4. Card sorting across thematic, technology, storytelling, and HPCI boards

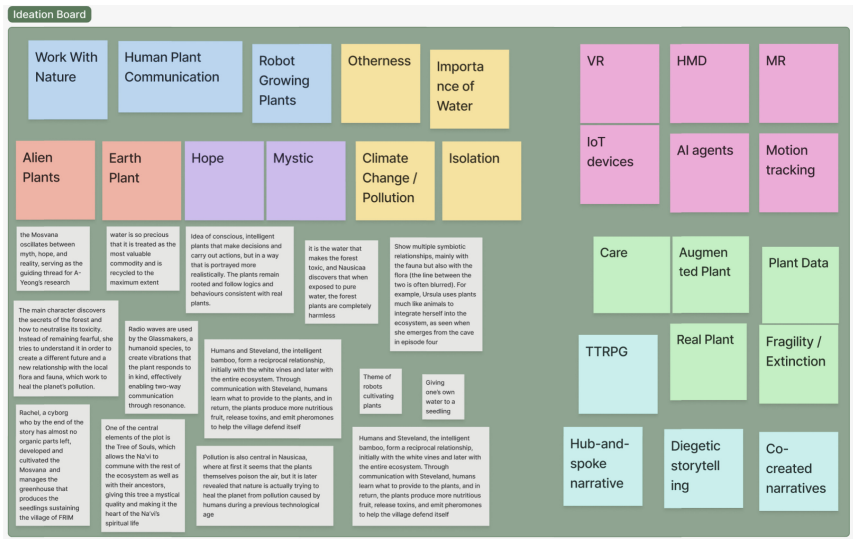


Fig. 5. Ideation board combining themes, technologies, narrative forms, and HPCI modalities



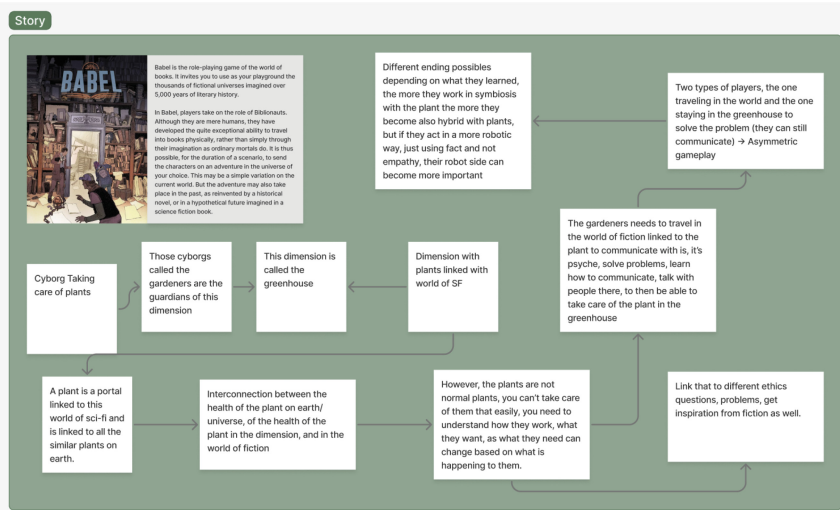


Fig. 6. Storyworld design canvas

In parallel, preliminary implementation strategies were articulated, including potential rules of interaction, candidate technologies, and system behaviors. This iterative process ensured alignment between narrative intent, interaction design, and technical feasibility, providing a robust foundation for subsequent prototyping.

To illustrate this translation more concretely, one example can be traced from the ideation board to the concept development. For instance, the thematic motif of *symbiosis*, combined with XR technology cards and the HPCI modality of *care*, led to a mechanic where the real act of watering a plant was directly linked to a change in the VR environment, such as rainfall or the opening of new pathways. This demonstrates how abstract narrative patterns were operationalized into tangible interactions, aligning speculative themes with mechanics that require coordination between caretakers of the physical plant and explorers inhabiting the plant's fictional world (Fig. 7).

### 3.5 Prototyping

The final phase focused on translating abstract design concepts into tangible artefacts through low-fidelity prototyping. Initial sketches were created to outline spatial arrangements, interaction flows, and narrative progressions (Fig. 8). These were followed by paper prototypes that simulated core interaction mechanics and system behaviors without the overhead of full technical implementation (Fig. 9).

This stage enabled early validation of assumptions, identification of design constraints, and iterative refinement of both narrative and technical components.



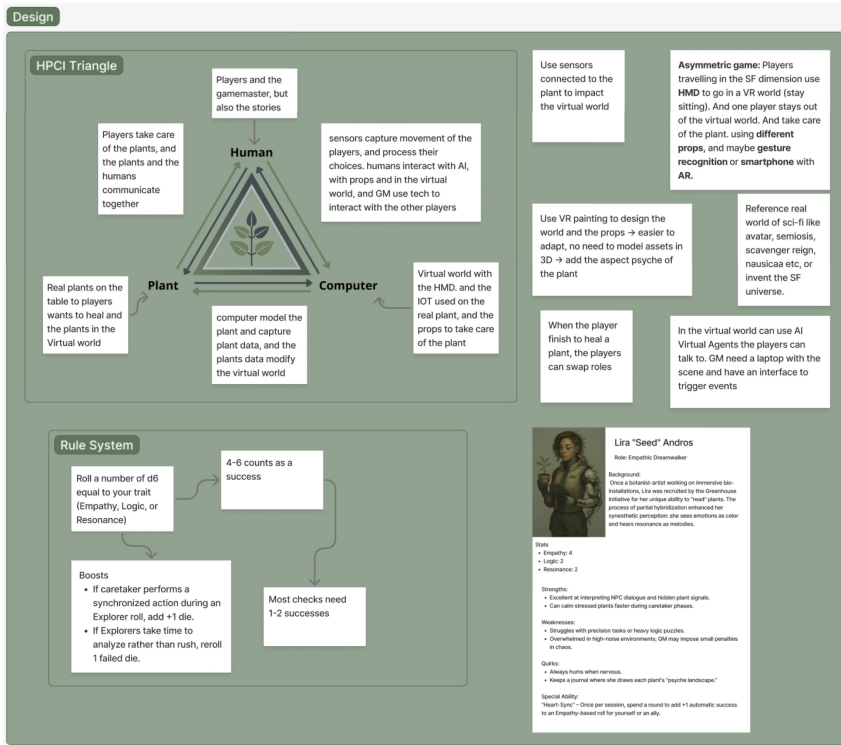


Fig. 7. Concept development using the HPCI triangle

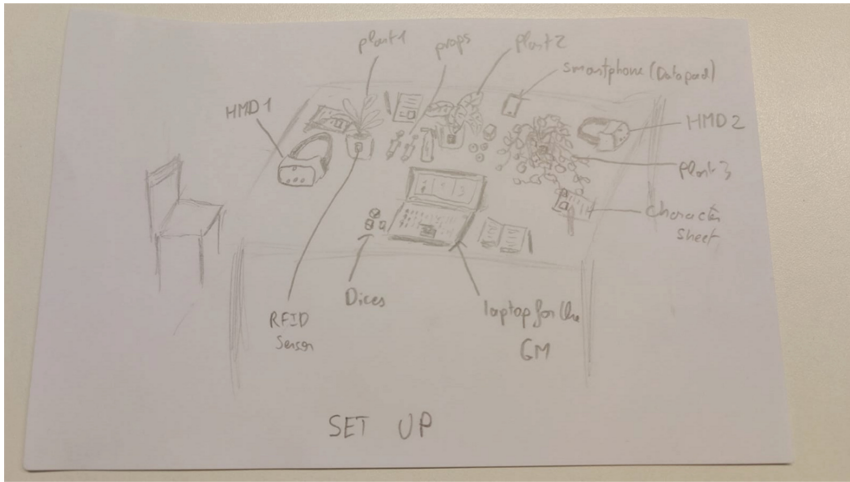
By externalizing abstract concepts into concrete artefacts, the prototyping process provided a structured foundation for later high-fidelity development and empirical testing.

### 3.6 Methodological Rigor and Iteration

Traceability was maintained by documenting links between corpus analysis, ideation choices, and design decisions. While exploratory, the pipeline provides a structured and reproducible method for translating speculative fiction into interactive artefacts. Future work will expand rigor through co-ideation sessions with researchers and participants to strengthen validity and diversity.

## 4 Results: The Whispering Greenhouse

Building on the pipeline described above, we developed an augmented tabletop role-playing game titled *The Whispering Greenhouse*. This prototype serves as a proof of concept that demonstrates how thematic insights from speculative fiction can be systematically translated into interactive narratives through the



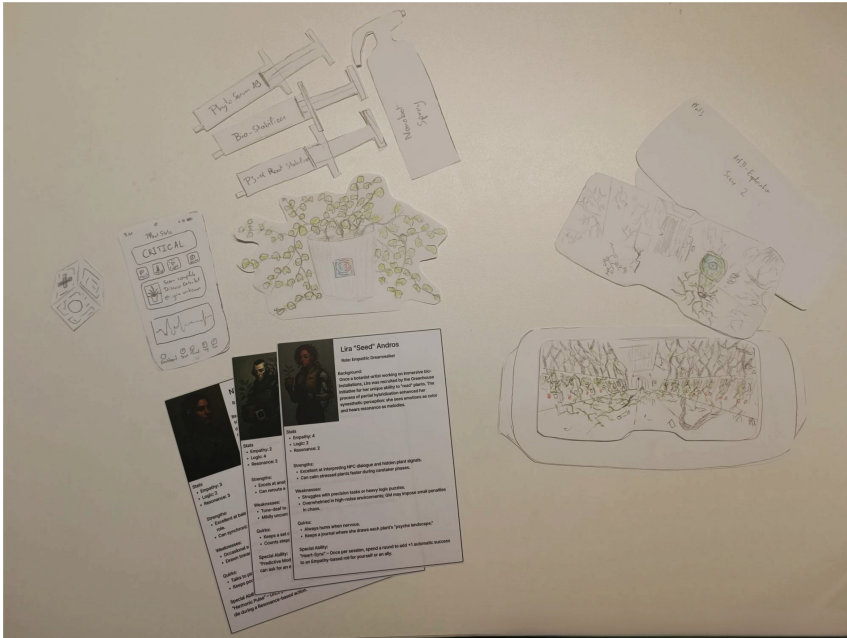
**Fig. 8.** Initial sketches of spatial arrangement and interaction flows

HPCI framework, providing a concrete outcome against which the methodology can be assessed.

In the game, players collaboratively heal distressed plants that act as portals into fictional dimensions. Each real plant on the table is connected to a speculative world inspired by works such as *Semiosis*, *Nausicaä*, and *Scavengers Reign*. The overarching narrative theme across sessions is one of *care versus control*.

Gameplay is asymmetric: one player assumes the role of *caretaker*, tending to the physical plant using props and sensors, while the other players act as *explorers* who traverse the plant's psyche in a VR environment. A lightweight d6 rule system emphasizes cooperation: caretaker actions such as watering or pruning directly modify outcomes in the VR dimension, while explorers decode puzzles, negotiate with NPCs, or face ethical dilemmas. This design requires constant communication between roles, reinforcing multispecies ethics through interdependence.

Three illustrative scenarios highlight the translation of corpus themes into mechanics. *The Mycelial Archive* (fern/moss) centers on trust and communication, where explorers interpret root rhythms while the caretaker stabilizes moisture. *The Fractured Oasis* (succulent/cactus) explores scarcity, requiring players to balance resource distribution, with real-world watering tied to narrative outcomes. Finally, *The Biomechanical Wreck* (ivy) stages dilemmas of integration versus sterilization, as players must choose whether to sever biomechanical growths or cultivate symbiosis. In each case, physical plant interaction and narrative decision-making are systematically intertwined, showing how speculative themes can be enacted through multispecies gameplay.



**Fig. 9.** Paper prototype of greenhouse-based interaction mechanics

## 5 Discussion

This study contributes to both IDN and HPCI by proposing a design research pipeline that translates from speculative fiction into actionable design processes. By combining thematic analysis, structured ideation, and iterative prototyping, our approach offers a reproducible method for creating interactive artefacts that center on multispecies relationships and ecological ethics.

The thematic analysis surfaced a range of motifs that shaped our design process. Plants were represented either as familiar terrestrial forms, as in *Wall-E*, *Pumzi*, *Mars Trilogy*, and *La Trame*, or as alien and otherworldly, as in *Avatar*, *Scavenger Reign*, *Nausicaä*, *Day of the Triffids*, and *Semiosis*. These representations influence how plants were positioned within storyworlds: either as extensions of known ecologies or as entirely new agents requiring reinterpretation.

Agency was a recurring concern. Some works portrayed plants as active hunters (*Day of the Triffids*), others as sentient beings with recognisable identities (*Semiosis*), and still others as diffuse collective entities expressed through symbiosis (*Avatar*, *Scavenger Reign*). This spectrum of agency offered models for rethinking humannature cooperation beyond extractive relationships. Four modes of humanplant symbiosis emerged across the corpus: humans attempting to control plants (terraforming in *Mars Trilogy*), plants shaping or even raising humans (*Semiosis*), human adaptation to uncontrollable flora (*Day of the Triffids*), and genuine mutual symbiosis (*Nausicaä*, *La Trame*).

Plants also carried diverse narrative roles. They appeared as threats through toxic forests, invasive species, and uncontrollable growth; as resources for food, medicine, or biofuel; and as sources of hope or reverence, inspiring sacred groves, dystopian escapes, or terraforming projects. A particularly striking motif was the recurring image of robots cultivating plants; Wall-E nurturing a sprout, hybrid beings in *Scavenger Reign*, or cyborg caretakers in *Greenhouse at the End of the World*. This entanglement of care, technology, and ecology resonates strongly with HPCI and guided our design of hybrid mediating agents.

Across the corpus, broader themes such as climate change, pollution, collapse, and isolation provided the narrative backdrop. Plant blindness was addressed both metaphorically, as in *Pumzi*, and literally, as in *Day of the Triffids*. In nearly every case, vegetation was central to reimagining society, either as a destructive force or as a partner in renewal.

These themes directly informed our ideation process by providing a vocabulary for ecological storytelling. Depictions of plant agency encouraged interaction mechanics based on co-agency and care rather than extraction. Symbiosis narratives suggested slower temporalities and reciprocal exchanges in gameplay. The motif of robotic cultivation inspired hybrid actors mediating between human and vegetal systems, which we mapped into our HPCI triangle during concept development.

By re-situating these thematic patterns in IDN design, our pipeline responds to gaps identified in prior frameworks [25,27]. Unlike existing approaches that foreground system mechanics or authorial structures, our method integrates speculative fiction as a generative input, enabling designers to embed multispecies ethics directly into narrative architectures. This makes the design process more transparent, reproducible, and adaptable to ecological contexts.

With the prototype develop through this pipeline, we also illustrates a spectrum of plant participation within IDNs. Plants may appear as representational agents in fictional storyworlds, as instrumental interfaces providing data, or as active collaborators whose temporal rhythms shape the unfolding narrative. Future iterations will extend this exploration by staging ecological temporalities—growth, decay, or seasonal cycles—within interactive systems, allowing IDNs to move beyond anthropocentric pacing. These directions resonate with practices in Environmental Humanities and Bio Art, where artists such as Eduardo Kac or Špela Petrič have explored humanplant interfaces as sites of poetic and ethical encounter. By situating HPCI within this wider lineage, our work highlights the broader cultural relevance of multispecies interactive narratives.

## 6 Conclusion

This work demonstrates how speculative fiction can be operationalized to design IDNs that explore HPCI. By combining thematic analysis, structured ideation, the HPCI triangle, and low-fidelity prototyping, we developed a reproducible pipeline that makes the design process more transparent and adaptable to ecological contexts.

The thematic patterns identified across our corpus, such as plant agency, symbiosis, and care-based interaction, expand the interaction space of IDNs and provide strategies to counter plant blindness while fostering ecological empathy. Our approach contributes to ICIDS by showing how narrative analysis can be transformed into concrete design practices, offering a pathway for embedding multispecies ethics directly into interactive systems.

Future work will focus on building high-fidelity prototypes, co-designing with communities and interdisciplinary experts, and conducting empirical studies to measure immersion, empathy, and ethical reflection. These next steps will help refine the pipeline as both a creative framework and a methodological tool for exploring alternative humanplanttechnology futures.

Ultimately, our work shows that speculative fiction is not only a medium for imagining futures but also a practical design resource for creating interactive narratives that foreground ecological ethics and multispecies collaboration.

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