Original Research

Embedding Narratives through Inclusive Design: A Multidisciplinary Exploration of the Roles and Applications of End-User Narratives Within and Beyond a MedTech Design Process

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Abstract: Narratives facilitate the communication of individual and collective experiences, perceptions, and interpretations of reality, enabling the depiction of authentic personhood as well as societal identity. Designers inherently embed and embody narratives through their work, positioning design as an agent of narrative. As a practice of inclusion, it is critical to advance the archetypal role of user-centered design from passively upholding dominant narratives, to becoming responsible for proactively uncovering, interrogating, and scaling a diversity and plurality of end-user narratives throughout the design process, with input from a range of project stakeholders. Design is framed as an agent of narratives through a conceptual framework consisting of three strategic narrative stages: (1) acknowledgement and capture, (2) negotiation and speculation, and (3) embedding and scaling. This research focuses on the second and third stage of this framework, exploring how to embed and scale narratives within and beyond a design process, focusing on the context of inclusive MedTech design. The case study of designing an upper limb arm-assist exoskeleton is used to interrogate the potential roles and applications of narratives at various levels and phases of a design process. A qualitative study and a mapping exercise are conducted with a multidisciplinary group of project stakeholders to capture their thoughts and expectations on how end-user narratives could and should be embedded within and scaled beyond the project-specific design process. The values of incorporating end-user narratives into an inclusive design process are discussed, and practical considerations and recommendations are provided for designers seeking to embed narratives within their work.

Keywords: Narratives, Inclusion, Design Process, Inclusive Design, Disability, Framing, Collaborative, Co-Design, MedTech Design.

Introduction

Narratives can facilitate the dynamic communication of interpretations of reality, making them an effective channel for designers to capture and understand individual and collective experiences, identities, thoughts, and knowledge. Designers have always embedded and embodied narratives through their work; however, this has typically occurred without explicitly exploring or interrogating a diversity and plurality of narratives as part of their design process. This particularly concerns moving beyond a dominant narrative, to multiple

alternative or counter-narratives that might exist at the peripheries for a multitude of reasons. Specifically, this requires acknowledgment and exploration of various experiential narratives informed by lived experience as well as more commonly recognized disciplinary and societal narratives (Shaw and Nickpour 2022).

End-user narratives become critically important when designing for typically marginalized groups, such as the disability community, as these narratives often differ from mainstream dominant societal or disciplinary narratives due to fundamental differences in lived experiences. To empower such communities and move toward social justice through design (Syal and Kramer 2023; Shaw and Nickpour 2023a), it is important to advance the archetypal role of design from passively upholding dominant narratives, to proactively uncovering, interrogating, and incorporating a diversity of alternative and counter-narratives too (Shaw and Nickpour 2023b). When used effectively, narratives hold the potential to help designers uncover and empathize with a diverse range of lived experiences, challenge dominant societal or disciplinary narratives through user-centered framing and amplify previously marginalized voices to achieve more desirable and appropriate designs.

Hence, this article is particularly relevant to those involved in user-centered areas of design, including Inclusive Design (Wilkinson and De Angeli 2014), Assistive Technology Design and Design for Disability, as well as similar areas of design where failure to effectively engage with a diversity of narratives can have major ethical implications and lead to detrimental impacts on both the identity the designed outcome communicates about its end users and the experience it provides them with. We define design as a process of sensemaking (Cooney et al. 2018), framing, and solving (Dillon 1982), which interweaves a combination of designerly principles, mindsets, practices, and techniques (Carlgren, Rauth, and Elmquist 2016) to generate outcomes across four orders of design (i.e., visuals, products, services/interactions, and systems) (Buchanan 2001) in the form of four types of design contributions—theoretical, methodological, empirical, and interventional.

This article builds upon a conceptual framework to establish how end-user narratives could be embedded within a design process and explores the potential roles and applications of narratives on multiple levels and at various stages throughout a design process, within the context of inclusive mobility design (Shaw and Nickpour 2021). A multidisciplinary project to design an upper-limb "arm-assist" exoskeleton for children and young people is used as an empirical case study to investigate how end-user narratives could be embedded within an inclusive MedTech design project and beyond. The case study project specifically focuses on designing a solution suitable for end users with progressive neuromuscular conditions such as Duchenne Muscular Dystrophy (DMD) and Spinal Muscular Atrophy (SMA).

Research Question and Contributions to Knowledge

This article addresses and reports on the following two research questions:

1. How could or should end-user narratives be embedded into (and beyond) a design process?
2. What benefits could embedding end-user narratives in a design process have for various MedTech project stakeholders?

In a previous piece of theory-building research, Shaw and Nickpour (2022) proposed a conceptual framework for Design as an Agent of Narratives, which is used for the first time in this real-world project to structure the exploration of end-user narratives using the three stages of (1) acknowledge and capture, (2) negotiate and speculate, (3) embed and scale, elaborated on in the following section, titled "Design as an Agent of Narratives." This article specifically focuses on the latter two stages of the conceptual framework and contributes new knowledge and understanding in the following ways:

1. Presents a methodology for conducting a collaborative narrative exploration exercise, with reference to the stages of the conceptual framework for Design as an Agent of Narratives.
2. Analyses, evaluates, and visualizes the exercise results.
3. Discusses and reflects on insights relating to different approaches identified through the narrative exploration exercise.
4. Summarizes opportunities and limitations relating to the practicalities of using this nature of collaboration to navigate end-user narratives and offers recommendations for practice.

Design as an Agent of Narratives

From a design perspective, end users hold a wealth of knowledge, information, and capabilities when they engage in and with designs and designing. Countless approaches, methods, and practices exist for involving end users and their voice in design, ranging from consultation and contribution to collaboration and co-design (Kohtala, Hyysalo, and Whalen 2020; Lloyd and Oak 2018). The ultimate aim of involving end users in a design process is to investigate and validate what is required for the design outcome to be useful, meaningful, and/or desirable to them. During designerly investigations, designers typically focus on capturing user requirement specifications, which quantify what the end user requires or needs from a design (Shaw and Nickpour, 2021). Starting from a "requirement" level typically causes the designer to automatically work within a specific narrative, without necessarily having first acknowledged and interrogated it. By proactively engaging with narratives from the outset of a design process, designers can take on the responsibility of defining which

narrative/s they are designing with or for, enabling more rigorous exploration, identification, and questioning of narrative classes and statuses (Shaw and Nickpour 2022) to help reframe or even redefine the problems or opportunities they are addressing. By engaging with a diverse range of narratives in this manner, the design process and outcome can become more critical, ethical, equitable, and just, with the specific agenda of bringing to the fore narratives that have historically been disregarded or silenced due to dominant views and discourses overshadowing marginalized voices (Jones 2016; Noel 2016; Roscoe, Chiou, and Wooldridge 2019; Sunderland 2019; Costanza-Chock 2020). Channeling narratives into a design process allows the voice and lived experiences of end users to be represented and centered in a similar way to traditional collaborative and participatory design-led approaches such as co-design. Shifting the responsibility to explore narratives away from only designers to instead making it a collaborative process in which all project stakeholders can participate encourages deeper consideration of information around a topic from a range of disciplinary and stakeholder perspectives. This enhances and democratizes the decision-making process and ultimately helps define, facilitate, and guide systemic transitions to create more meaningful user-centered design outcomes.

To achieve this, the "Conceptual Framework for Design as an Agent of Narratives" (Shaw and Nickpour 2022) outlines the following three narrative stages, which can be superimposed onto various design process models (example given in Figure 1), describing key activities for incorporating narratives into a design process:

1. "Acknowledge and Capture" a variety of narrative classes and statuses with specific attention to typically marginalized narratives.
2. "Negotiate and Speculate" in a collaborative manner to explore priorities, tensions, opportunities, and relevance of each captured narrative to reach a shared understanding and co-definition of which narrative(s) will be carried forward in the project.
3. "Embed and Scale" the co-defined narrative by embedding it within the designed outcome to shape end-user experiences, and by scaling it for use in contexts beyond the design process.

By focusing on the latter two stages outlined above ("Negotiate and Speculate" and "Embed and Scale"), this study interrogates how and where in the design process project stakeholders could and should capture, represent, question, challenge, reshape, merge, communicate, and incorporate end-user narratives.
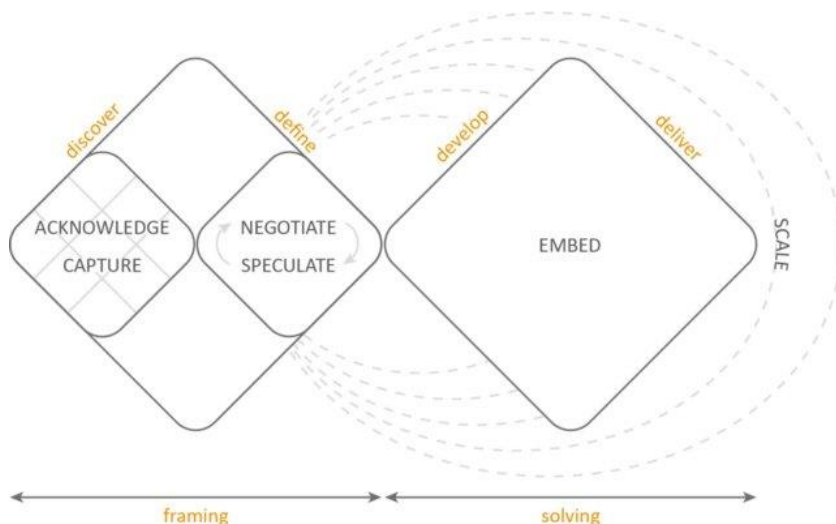
Figure 1: Example of the Conceptual Framework for Design as an
Agent of Narratives, Applied to the 'Double Diamond' Design Process Model
Source: Shaw and Nickpour 2022

Methodology

This article centers around a collaborative case study conducted with a multidisciplinary group of representatives from the team working on the design of an upper-limb exoskeleton for children and young people. The team included two charities as project clients, one design consultancy leading product development, one MedTech research company, one academic design research lab, a project Advisory Board, and a Steering Committee. The stakeholder representatives who participated in this study are listed in Table 1.

Table 1: Discipline or Background of the Ten Participating Project Stakeholders

	Stakeholder Role in Project	*Discipline or Background*
A	Project Manager	Design
B	Research Director	Clinical
C	Design Consultant	Human Factors and User-centered Engineering
D	Design Engineer	Product Development
E	Lived Experience End User	Neuromuscular condition
F	User Representative	Neuromuscular charity
G	Innovation Expert	Healthcare
H	Innovation Manager	MedTech
I	Market Intelligence	MedTech
J	Fundraising Director	Marketing and Communications

This article specifically focuses on the collaborative and multidisciplinary exploration of the potential roles and applications of identified end-user narratives within the exoskeleton design project. It is important to note that the project stakeholders who took part were selected to be fully representative of the different disciplines and stakeholders relevant to the end user group in this case study project, including a Lived Experience End User and a User Representative, who also validated the narratives in the activity. A brief description of how the end-user narratives used in this activity were captured is provided in this section, simply to offer more context, although the actual process for capturing and analyzing narratives is not the focus of this article; a more detailed description about the methodology used to capture and analyze end-user narratives can be found in a prior study by the authors (Shaw and Nickpour 2023b).

The narratives included in this study were captured through conducting semi-structured narrative interviews with eighteen individuals with progressive neuromuscular conditions (primarily DMD and SMA), who could benefit as end users of the future upper-limb exoskeleton design. The "Inclusive, Creative, Equitable and Responsible Participant Recruitment Framework" (Shaw and Nickpour 2023c) was utilized to ensure the interviewees (and thus the resulting identified narratives) were representative of the diversity of possible end users of the exoskeleton being developed. Transcripts from the interviews were analyzed as an initial sense-making activity to explore the end users' lived experiences flexibly and in detail to acknowledge and capture meaningful experiential narratives. Related quotes from the transcripts were clustered together to identify emerging narrative themes while ensuring the qualitative data was kept intact and not diluted. Each theme was given a title metanarrative, which aimed to summarize and encapsulate the meaning and essence of the quotes clustered beneath it. Similar metanarratives were merged, which led to the identification of eight high-level narratives. Along with their related quotes, these were shared with the multidisciplinary team of ten project stakeholders (listed in Table 1) during a design feasibility workshop, where they were invited to suggest any other narratives that they thought had not been captured through the transcript data analysis process. One additional narrative was put forward by another researcher on the team, and this was added to the final nine narratives (see Table 2).

The ten selected project stakeholders were then presented the narratives on flashcards with illustrations and example quotes from the end-user interviews (as shown in Figure 2), and were asked to familiarize themselves with the final narratives before carrying out an exercise consisting of the following three steps:

1. Nominate (and negotiate) which narrative(s) are most important to incorporate into the project.
2. Explain your reason for nominating this narrative.
3. Suggest (and speculate) how the nominated narrative could or should be incorporated into the design process and beyond.

Figure 2: Narrative Flashcards Presented to the Project Stakeholders as Part of the Narrative Exploration Exercise

This exercise aimed to establish which narratives to include in the design and explore how they could and should be incorporated into the project according to different project stakeholders. The latter two stages of the "Design as an Agent of Narratives" framework were addressed through this exercise by (1) initiating negotiation and speculation about the narratives among the ten participating project stakeholders, and (2) understanding how the narratives could be embedded and scaled according to different disciplinary and experiential backgrounds. The ten project stakeholders were provided with a worksheet to record their responses to the exercise which were collected and used as the data source for this study.

The stakeholders' responses to the first step of the exercise were analyzed to quantify how many stakeholders "nominated" each narrative. The most and least nominated narratives were identified, as well as how each narrative was ranked by stakeholders who nominated more than one narrative. The stakeholders' responses to the second step of the exercise were analyzed to gain insight into stakeholders' interpretations of the narrative and get a deeper qualitative understanding of the different reasons why narratives were nominated. Responses to the third step of the exercise were analyzed and mapped out against the phases of the project design process (Figure 3) to illustrate which level/s and phase/s the stakeholders suggested the narratives could be incorporated into the project.

The design process being utilized in this project (Figure 3) was put forward by the design consultancy partner who is leading design practice work in this project; it is a flexible process that the design consultancy applies to all their design projects across various areas of product and experience design. Their process follows five key phases in a linear nature, including phases for discovery, concept, iteration, detail, and delivery. There is a noticeable resemblance between this design consultancy's design process model and the UK Design Council's Double Diamond model illustrated in Figure 1. It was decided that the three stages of the conceptual framework for design as an agent of narratives could be applied to the design consultancy's process in a similar way, thus conducting this narrative exercise in the "discovery" phase while still framing the project.
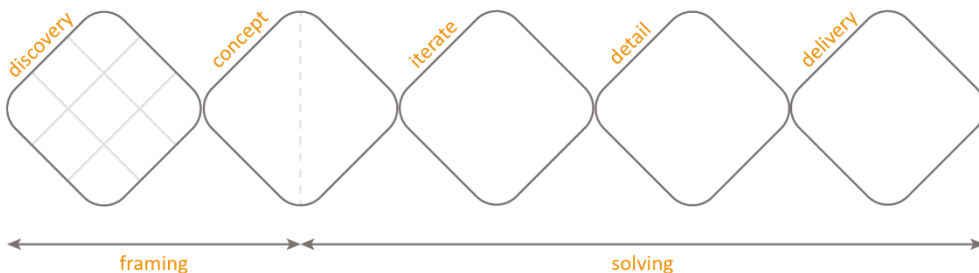

Figure 3: Design Process Used in the Case Study Project

Exercise Results and Insights

The full detailed responses to the exercise provided by the ten project stakeholders are presented in tables in the original dataset on Mendeley Data (Shaw 2023), documenting different stakeholders' opinions, priorities, and suggestions about why certain narratives are important and how they could or should be utilized and embedded within the project.

Nomination, Ranking, and Grouping of Narratives

Table 2 presents the nine narratives included in the exercise and summarizes how many and who of the ten stakeholders nominated each narrative for inclusion in the project, as well as how many of the stakeholders ranked each narrative as "most important" to the project. Stakeholders are listed using their corresponding letters (A-J) as assigned in Table 1. When looking at the numbers in Table 2, it is worth bearing in mind that there was no limit to the number of narratives stakeholders could nominate. It is also worth highlighting that one stakeholder did not rank any of the narratives as "most important" while another stakeholder ranked three narratives as jointly "most important." Full details of what ranking/weighting stakeholders assigned to each narrative can be found in the tables in the original dataset (Shaw 2023).

Table 2: End-User Narrative Descriptions and the Number/Type of Stakeholders Who Nominated Each of Them

	Narrative description	How many nominated it?	Who nominated it?	Ranked most important by
1	"Living with, not defined by"	7	**E, I, J, D**, A, C, H	**4**
2	"Everyday me (blending in with peers)"	7	**G, D**, F, H, J, E, C	**2**
3	"Embracing difference; my superpower"	3	F, D, C	**0**
4	"From [dis]ability to superability"	3	D, C, F	**0**
5	"With me for the whole (unknown) journey"	4	F, C, E, D	**0**
6	"Just getting on with life"	6	**F, H, D, A**, I, J	**4**
7	"We're expert adaptors and improvisers"	3	C, F, G	**0**
8	"Being in control as my support needs change"	7	G, F, I, D, J, H, C	**0**
9	"Later is too late"	6	**C**, H, D, G, A, F	**1**

The number of narratives nominated by different stakeholders varied from zero to eight; the Research Director did not specifically nominate any narrative, while the Design Consultant, Design Engineer, and User Representative all nominated eight narratives. No stakeholder nominated all nine narratives. The Project Manager, Lived Experience End User, and Market Intelligence each nominated three narratives. Table 2 shows that all nine narratives were selected for incorporation in the project by at least one stakeholder. The least popular narratives (n = 3) were nominated by three different stakeholders, while the most popular narratives (n = 3) were also nominated by three different stakeholders. Narrative 1 received the most engagement, being nominated by seven stakeholders and being ranked the "most important" narrative by four of these stakeholders. Narrative 6 received one fewer nomination than Narrative 1 but it was also ranked the "most important" narrative by four stakeholders.

The weighting given to each narrative in terms of its ranking relative to the other narratives a stakeholder nominated can be used to better understand each stakeholder's priorities and preferences regarding the incorporation of certain narratives in the project. Details of the weightings that each stakeholder specified have been included with the full dataset of stakeholders' responses, available online at Mendeley Data (Shaw 2023).

One behavior common across almost all stakeholders was the inclination to give some form of hierarchy to the narratives, either by ranking them in order of most to least important or by connecting and grouping narratives together, comparing them and finding similarities around multiple narratives. A summary of the suggested narrative groupings from the combined exercise responses of all stakeholders has been illustrated in Figure 4, using the narrative numbers (see Table 2 for reference) with lines between them to show the suggested connections, with heavier line weights for the connections that were suggested by multiple stakeholders. Further details of the stakeholders' suggested groupings have been included in the dataset that can be accessed online (Shaw 2023). The strongest connections were between narratives 5 and 8, and between 3 and 4. Narrative 9 was the only narrative that none of the stakeholders connected or grouped with another narrative, indicating that it has less in common with the other narratives in terms of its role in the project.

Figure 4: Summarized Narrative Groupings from the Combined Exercise Responses of All Stakeholders

Most stakeholders gave little attention to justifying their suggested narrative hierarchies through this exercise, although those who jointly ranked narratives tended to offer an explanation for their thinking. For example, the Design Engineer "felt that a number of the narratives were similar in spirit so have grouped these together," while the User Representative justified their decision by explaining "the two narratives can exist in parallel." The Research Director took a slightly different approach to the exercise; instead of nominating or ranking the narratives, they grouped the nine narratives into wider metanarrative groups, as listed below, and suggested that some of the groups should be considered as "underpinning" narratives that "need to be prioritized."

1. "The device is an enabler for independence, living the best life possible, and empowering people to be who they are (1, 3, 6)."
2. The device is a means to become more confident, fit in in society, something to be proud of (2,4)."
3. "The device is adaptable to changing needs, diverse lifestyles etc. (7, 8, 5)."
4. "The device is needed NOW - 9."

Certain tensions and conflicts between opposing narratives were also highlighted through the exercise; for example, one stakeholder commented on how embedding different narratives in the project "could lead to quite different directions as far as for example wearability and look of the device (seamless and discrete vs something that could look fun and exciting)." This raised a question around how conflicting narratives should be dealt with going forward in the project.

Embedding End-User Narratives in the Design Process and Beyond

The third step of the exercise asked stakeholders to suggest how the end-user narrative(s) they nominated should be incorporated into the design process or beyond. Thematic analysis of responses to this step was conducted to identify and categorize which levels of the project the end-user narratives could/should be incorporated into, according to the project stakeholders. The Conceptual Model of Design Thinking (Carlgren, Rauth, and Elmquist 2016) was used as a foundational structure for categorizing the suggested narrative applications into the following four levels: "Mindsets" (attitudes and ways of thinking or framing), "Principles" (values that steer design direction and help justify decisions), "Practices" (ways of working and doing, including designerly ways), and "Techniques" (methods and tools). Three further levels of suggested narrative application were identified through analyzing the responses which included: "System/Service" (elements surrounding the product including business model, commercialization, and policy considerations), "Product Requirement" (intended use scenarios, user requirements, "essential" and "desirable" functions, features, and aesthetics),

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and "Communication" (engagement with end users, recipients, or external/public relations). All the suggested applications of narratives fitted within one or more of these seven levels.

The responses were mapped out against the phases of the project design process (Figure 3) to identify at which phases stakeholders suggested applying different levels of narrative, as illustrated in Figure 5. The levels of the project are listed in the vertical axis of Figure 5, and the phases of the design process are listed in the horizontal axis, moving chronologically from left to right. The key provided at the top of Figure 5 refers to the Narrative numbers that are listed with the narrative description in Table 2. This visualization of the data represents the co-definition of the narratives to be carried forward in the design process for embedding and dissemination.
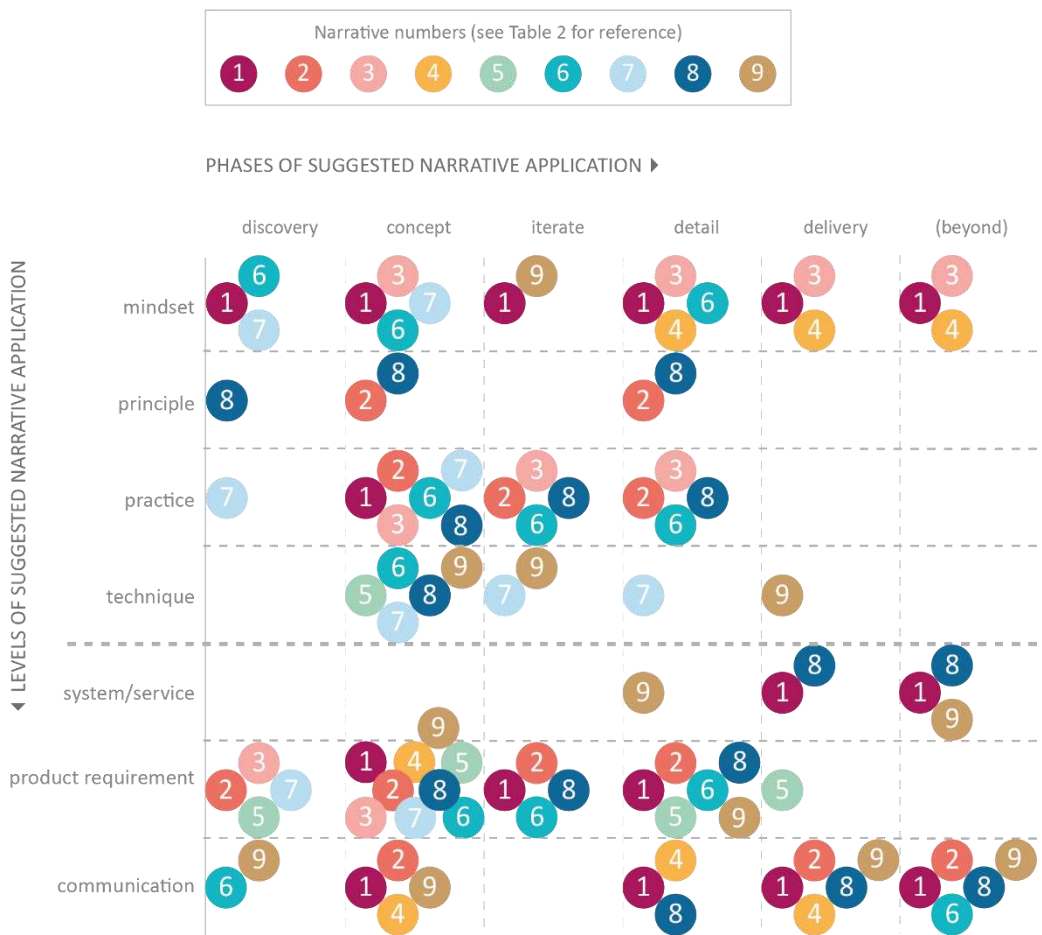

Figure 5: Mapping Stakeholders' Collective Suggestions for Incorporation of
Narratives at Various Levels and Phases of the Project

In the initial "Discovery" stage of the design process, narratives were mainly suggested for application at the "Mindset" and "Product Requirement" levels, where the suggested narratives could be used to inform attitudes or ways of thinking and framing the entire project, as well to validate assumptions which could go on to inform product or user requirement specifications. The highest density of suggested narrative application can be seen on the "Product Requirement" level in the "Concept" phase of the design process, where all nine of the narratives are collectively suggested for incorporation. This is the level and phase of the project where activities such as documenting a user requirements specification (URS) take place, which indicates that stakeholders consider the incorporation of narratives at a product level to be a priority, with regard to embedding narratives in the project's interventional contribution. In the "Delivery" stage of the design process, narratives were mainly suggested for application at the "Communication" level, where they could be used to inform how the project is depicted or sold to prospective users and external stakeholders such as journalists and the media for publicity and promotion of the design. "Communication" is also the main level where stakeholders suggest narrative application "beyond" the design process, meaning the narratives here could be scaled to achieve external influence such as in other future design projects or externally from a design process in public discourse. The levels of "Mindset," "Systems/Services," and "Communication" are the only levels on which narratives could be scaled beyond the design process, while all the other levels where narratives are suggested are to be embedded within the design process.

Implications and Recommendations for Practice

In this section, we consider the strengths, weaknesses, and opportunities relating to the practical experience of using this nature of collaborative exercise to navigate end-user narratives and offer insights and recommendations for practice.

When conducting a narrative exercise like this with project stakeholders, it is firstly essential to ensure a full range of representative project stakeholders are involved, to cover the breadth of different disciplinary and experiential backgrounds present on the project team and to maximize the number of perspectives and lenses through which the narratives are explored. It is worth acknowledging the potential ethical implications of who is or is not selected to participate in the exercise and how participants' positionality could influence their choice of narratives.

Future studies utilizing this exercise could consider collecting positionality details from project stakeholders as part of the process to allow another level analysis, perhaps involving positionality word clouds, to examine if and why a narrative was chosen in relation to stakeholders' implicit biases and worldviews. It is also worth considering the benefits and disadvantages of conducting this exercise as an individual activity versus conducting it as a group activity. One practical benefit of conducting it as an individual activity (in this case

using worksheets to collect individual stakeholder input) is that it allows busy stakeholders to participate in their own time and at their own pace, to ensure the response they provide conveys the depth and detail they consider necessary. Another benefit is that individual stakeholder input enables the undiluted opinions and perspectives of all participants to be captured, whereas a group exercise risks the input of quieter participants being dominated by those with louder or more confident opinions. Even within an individual exercise, it is interesting to compare the use of language across participants' responses, where some stakeholders use expressions such as "I feel," "I think," and "I really like," while others use more assertive terms like "we must."

The authors did not ask the participants to offer feedback about the narrative exercise presented in this article; however, a few stakeholders shared their opinions, which could be of interest to readers. Some stakeholders expressed their perceived benefits of taking part in the activity, explaining how it was something they would not usually consider at the early stages of a design project but appreciated how it brings all stakeholders closer to the user-centered research elements of the project. One participant wrote "I quite enjoyed thinking about these narratives with the examples provided," referring to the quotes from interviews included on the flashcards. In contrast to this, it is worth bearing in mind that the concept of "narrative" could be quite new or unusual to certain disciplines and stakeholders. For example, one stakeholder wrote "to be totally honest this [narratives] is an area that I have little experience in." To avoid stakeholders expressing uncertainty or lacking confidence to participate in a narrative exploration exercise such as the one presented in this article, it is beneficial to consider how the exercise could be facilitated in a way to give reassurance and confidence to participants who are unfamiliar with narratives or qualitative activities like this. This could include a preparatory session to contextualize narratives for stakeholder participants before introducing the exercise, or simply clarifying what narratives are, their significance and impact in certain contexts, how they are defined and framed in the context of design, and opportunities and limitations for utilizing narratives in a design process.

In this article, the graph presented in Figure 5 combines the suggested narrative applications from all stakeholders. However, in practice it might not always be feasible or desirable to embed all the nominated narratives in a design, which raises questions around who gets the ultimate say in which narratives are included or excluded going forward. Thus, while this graph could be used as a map to direct designers as to how and where to consider various narratives throughout the design process, it could also simply be used as a tool to facilitate a group conversation and further negotiation around the narratives, with the aim of reaching a shared understanding and the co-definition of which narrative/s will be carried forward for embedding and dissemination.

Once the level and phase of narrative application has been suggested, it is important to consider how best to package the narrative for use by different stakeholders at different phases in the design process, to work within existing systems and with existing designerly ways,

particularly with regards to technical documentation. It makes sense to prioritize exploring how best to package narratives in the areas of the graph in Figure 5, where the highest density of suggested narrative application can be seen (e.g., at the "Product Requirement" level in the "Concept" phase of the design process). With regard to this area of the graph, one stakeholder participant wrote "It was interesting to think about how narratives could be embedded into the 'design input' for an ISO 13485 compliant development project (e.g., by trying to capture them as validatable requirements in the URS) ... I'd definitely like to further explore how this integration can be done most effectively." By further exploring how narratives need to be used in such ways, we can optimize how they are packaged to ensure nominated narratives can achieve impact at the appropriate levels and phases of a design project.

Conclusion

This article infers that designers must assume responsibility to actively engage with narratives through their work to position design as proactive, perceptive, critical, generative, and advanced agent of narratives, particularly in areas of design such as Inclusive Design and Assistive Technology Design. It is proposed that narratives can be used in design to amplify and center the voice of end users; enhance shared and inclusive decision-making; challenge dominant mindsets, stereotypes, and disciplinary biases of project stakeholders; and democratize participation to ultimately help define, facilitate, and guide systemic transitions. To explore how a diversity of end-user narratives could be incorporated into an inclusive MedTech design project, the case study of designing an upper body arm-assist exoskeleton is interrogated in this article. A qualitative study is conducted with a multidisciplinary group of project stakeholders to capture their thoughts and expectations on which end-user narratives should be included in the project as well as how the nominated narratives could and should be embedded within or scaled beyond the design process. The two narrative stages of "negotiating and speculating" and "embedding and scaling" from the conceptual framework for Design as an Agent of narratives' are used to structure the study.

The study revealed the most commonly suggested level and phase of the project to incorporate narratives was the "Product Requirement" level in the "Concept" phase of the design process, where activities such as documenting a user requirements specification typically take place. This highlighted the need for future research to focus on exploring how best to package narratives in a way that they can be appropriately embedded within formal design documentation. It would be beneficial to conduct a future study upon completion of this MedTech design process, to report back on the reality of embedding narratives in design practice, and to evaluate if and how end-user narratives have been embodied by the final design outcome, as well as what impact this has ultimately had for end users.

The article provides novel insights into how end-user narrative could be embedded within design practice, introduces a methodology for multidisciplinary teams to navigate

end-user narratives, and offer considerations and recommendations for practice. This article may be of interest to academia, industry, and policy professionals in the broader realms of user-centered design practice, including new product development, industrial design and those interested in research issues relevant to advancing innovation, inclusion, and ethics in design processes.

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Informed Consent

The author has obtained informed consent from all participants.

Conflict of Interest

The author declares that there is no conflict of interest.

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