



Xiao Chen

Visible Prosthetic Futures

Visible, prosthetic
life, beauty, and
acceptance by 2075

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Statement of Authorship and Acknowledgements

This project has been completed as an individual independent research project. The research topic, questions, framing, and written content are my own. Throughout the development of the project, I received formative feedback through tutorials, critique preparation, and teaching sessions within the programme. I also referred from published literature, design projects, exhibitions, and conference materials, all of which are acknowledged in the text and reference list. While I benefited from academic guidance and discussion, all decisions regarding the project's focus, interpretation, argument, and final presentation remain my own.

Use of AI Disclosure

This submission was produced by me in my own words and using my own images, except for quotations and images from published and unpublished sources which are clearly indicated and acknowledged as such. The source of any picture, map or other illustration is also indicated, as is the source, published or unpublished, of any material not resulting from my own experimentation or observation.

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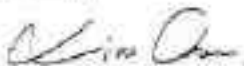
For the submission:

I used AI in the following ways:	• to support brainstorming and clarify the structure of the report • to help organise and refine the writing of draft sections that I then edited in my own words • to help format references and appendices concisely
I used the following prompts:	• prompts to help structure sections of the PPE report, including (introduction, background, problem framing, design limits, approach, and methodology) • prompts to help organise literature and predict review material

I acknowledge that I have used AI in accordance with my programme's assessment requirements and that I have fully declared the extent to which I have used it.

Full name: Xiao Chen

Signed:



Date: 11 April 2020

Part I: IRP Proposal

1. Introduction and Justification of the Topic

This project explores how future attitudes towards visible upper limb prostheses may shift as bodily difference becomes increasingly entangled with design, public visibility and changing social meanings (Hewitson, 1997; Garland-Thomson, 2009). Prostheses have historically been viewed as medical technologies designed to replace a missing limb or to compensate for a body's inability to function properly. At the same time, however, they are becoming increasingly contested as means of identity, expression and visibility (Sassoon et al., 2016; Siam and French, 2018; Khalpezi et al., 2024). This shift raises broader questions of body politics: what is considered 'normal', 'beautiful', or 'acceptable' and how these standards may shift with time (Davis, 1995; Garland-Thomson, 2002; Sibero, 2016).

Visible upper limb prostheses are particularly relevant because they are often closely connected to appearance, posture, identity and public interaction. The project primarily focuses on young adults, as young adulthood may be a time when self-image, confidence, belonging and how the body is understood by others are more actively negotiated. While there were developments in customizable design and emerging body technologies (Hoyles, 1998; Lovatze, 2018; Ojan-Banics, 2020), the emphasis was not on technical development for the project. Instead, visible upper limb prosthetics are used as a lens through which to examine future attitudes towards bodily diversity and non-normalized embodiment.

The project is therefore situated within a social and cultural challenge rather than a purely technical one. The central issue is not only how prostheses function, but also about their public meaning and the way they are perceived or appropriated. Current research and practice frequently focus on rehabilitation,

engineering or aesthetic customisation, while giving less attention to how longer-term changes in social attitudes may reshape stigma, body norms, belonging and bodily acceptance for young adult users (Sloane et al., 2018; Wright et al., 2024). Such changes may influence which bodies are recognised as ordinary, desirable or socially valued.

A Design Futures approach is appropriate because the project is concerned not only with what prosthetics currently are, but with what they may come to mean (Dunne and Raby, 2013). The purpose is not to predict a single future, but to use future-oriented research and speculative design to explore possible changes in attitudes, values and body norms. By imagining, discussing what we, body politics and speculative design into dialogue, the project examines how visible upper-limb prosthetics may reshape future perceptions of beauty, stigma and bodily acceptance (Garland-Thorne, 2006; Dunne and Raby, 2013; Haines, 2015).

2. Background: Literature, Practice, Signals and Trends

a. Research Question(s)

Main research question:

How might future attitudes towards visible upper-limb prosthetics reshape ideas of beauty, stigma and bodily acceptance among young adult users?

Sub-question:

How could visible upper-limb prosthetics shift from medical devices for repair to socially recognised objects of identity, expression, and body politics?

How may changing social attitudes toward visible upper-limb prosthetics influence the future acceptance of young adult prosthetic users?

2. Research Process

This review was developed through an iterative process of literature and particle mapping. The research began with theoretical texts on posthumanism, disability studies, and body–technology relations in order to establish a foundation for understanding prosthetics beyond medical repair (Barad, 1997; Hayles, 1999; Garland-Thomson, 2005). Key literature was then grouped into thematic categories, including aesthetic norms, body politics, visibility, gaze and belonging, and visible prosthetics. Meanwhile, parallel sessions were gathered to investigate the ways in which these concepts have been realized through design, art, performance and new technologies (Chabon, 1985; *The Absentee Limb Project*, n.d.; Open Bionics, 2022).

Tutorial feedback was used to focus the project as it evolved. In particular, the research shifted from a general interest in prosthetics and posthuman bodies to an investigation of visible upper-limb prosthetics, body politics, and future attitudes towards bodily difference. To facilitate this, futures and speculative design references were included, linking current body politics with long-term questions about ability, beauty norms, stigma and evolving social acceptance in the case of upper limb prosthetic users (Dunn and Fraby, 2010; Barendse and Voogt, 2021; Haines, 2012).

others (Davis, 1995; Gerslind-Thomsen, 2002; Sjöberg, 2010). What Davis does in the field of "normalcy" is of special interest because of the emphasis on historical construction of standards of the body (Davis, 1995). In addition, Gerslind-Thomsen has shown that bodily difference is not only formal but also shaped by visual, social and cultural processes (Gerslind-Thomsen, 2005; Gerslind-Thomsen, 2011). Gerslind-Thomsen shows how viewing operates as a social process through which visible bodily difference is interpreted, classified and judged (Gerslind-Thomsen, 2006). Together, these indicate that the evaluation of a body with a prosthesis is based not only on function but also on broader systems of beauty, visibility and social belonging (Gerslind, 1993; Davis, 1995; Gerslind-Thomsen, 2006).

The second cluster of key literature is related to the extended body, posthumanism and social embodiment. What makes Haraway's cyborg theory relevant is the fact that it challenges the visibility, naturalness and completeness of the body (Haraway, 1991). Her emphasis on the cyborg, described as "a creature of social reality as well as a creature of fiction", is relevant not only because of the linkages made between the prosthetic body and both lived reality and cultural imagination, but also because of what it might reveal about postmodern bodies disrupting taken-for-granted ideas about what constitutes a normal, beautiful or acceptable body (Haraway, 1991). Hayes goes further to make the argument that bodies are no longer simply biological entities, but are increasingly connected with information, systems and interfaces (Hayes, 1996). These texts are useful because they opened the discussion of prosthetics beyond a narrow focus on repair to include augmentation, redesign and hybrid embodiment. They also help elucidate visible prostheses as bodily forms that serve as sites for negotiating political and social interpretations of bodily difference. In this sense, prosthetics are important not only as forms of augmentation or hybrid embodiment, but also as elements of visible bodies.

that may be accepted, admired, questioned or stigmatized in different social contexts (Clark, 2003; Gray, 2001; Haroot, 2006; Goffard-Thomson, 2009).

The practice review extends these debates through design, art, performance, architecture, and speculative projects (The Alternative Limb Project, n.d.; Sletten, 1999; CCCB, 2015). Expressive prosthetic design projects alone may position many intersections of the medical body towards visible and expressive forms of identity and self-presentation (UNPG, n.d.; Dorn and French, 2018). These examples suggest that prosthetics are not only assistive devices, but also visible cultural body objects that may challenge assumptions about normality, beauty, and bodily difference (Sletten, 1999; Cylind Arts, n.d.a; Cylind Arts, n.d.b). Public representation and exhibition projects demonstrate that prosthetics have increasingly entered wider cultural and design discourse (V&A, 2020; Young V&A, 2021). Future-oriented projects such as Transfigurations further suggest that body modification may become connected to future questions of bodily visibility, desirability, and social acceptance (Haines, 2013; CCCB, 2015). For this project, visible upper limb prosthetics are especially important because they are directly connected to public visibility, appearance, gesture, and social interaction.

The signals identified through the trend wall also support this perspective. The first signal is the increasing visibility and normalization of prosthetics across artistic and commercial examples. This suggests a shift from medical anonymity towards visible self-expression and aesthetic agency (UNPG, n.d.; Phelps et al., 2024; The Alternative Limb Project, n.d.). A second signal is the growing public discussion of visible bodily difference, body modification and socially accepted forms of non-normative embodiment. This suggests that prosthetics are increasingly entering wider cultural and social debates rather than remaining only within medical contexts (Goffard-Thomson, 2009; V&A, 2020; Open Barbra, 2025). The third signal is growth of speculative body

design project, which imagines new bodies not only through enhancement, but also through changing norms of visibility, appearance, and beauty (Haines, 2012; Durso and Raby, 2013). This belongs to a wider trend in which body technologies move beyond repair and toward augmentation, redesign, and adaptation (Borenstrog and Veege, 2021; Haines, 2012). These trends suggest that prosthetics are increasingly becoming cultural indicators of how future societies may negotiate body politics, beauty norms, stigma, and belonging (Borenstrog and Veege, 2021; Haines, 2012; Gerland-Thomson, 2009).

Overall, the review identifies a gap between existing prosthetics research and future-oriented design inquiry. Rehabilitation, engineering and aesthetic customisation are already well represented, and some practices demonstrate how prosthetics can operate as expressive or visually distinctive objects (Samson et al., 2016; Phelps et al., 2020). Less attention has been paid to how longer-term changes in public attitudes may reshape the interpretation and lived consequences of visible upper-limb prosthetics, particularly for young adult users. The intersection of socially read and publicly negotiated prosthetic bodies is part of this gap. The gap also includes questions of beauty, stigma and bodily appearance (Durso and Raby, 2013; Borenstrog and Veege, 2021).

4. Conclusion Summary

The following are three central findings of this review.

Prosthetics have become not only reparative medical tools but increasingly cultural, aesthetic and technological artifacts. In the literature and practice studied, visible upper-limb prosthetics are seen not just as anathemas to restoring bodily function, but also as media of identity and visibility, social

hearing, and bodily differences (Sanson et al., 2019; Storm and French, 2018; Horaway, 1993).

Secondly, the notions of 'normal', of 'beauty' and the 'acceptable body' are not natural, but are socially and culturally produced. Literature in Disability Studies, Feminist Disability Studies and aesthetics show that bodily difference is constructed through norms, representation and regimes-of-sight (Davis, 1996; Garland-Thomson, 2002; Roberts, 2010; Garland-Thomson, 2009).

Third, the meaning of *any* prosthesis is not simply functional but is also socially interpreted. Previous projects and theoretical texts illustrate that visible upper-limb prostheses are read not only according to their technical use but also in terms of visibility, stigma, self-expression, design and belonging (Goffman, 1983; Cline, 1999; Garland-Thomson, 2009). For young adults who use visible upper-limb prostheses, these meanings are direct because their prostheses are linked to how they appear in public, their social encounters and daily life.

In this review three significant trends and future directions are also provided.

The first is what we can call the shift from a repair-oriented framework to a wider range of identity, expression and social interpretation. Upper-limb prosthetics might be increasingly understood not only as a means of compensation but also as objects on the body offering opportunities to challenge perceptions of 'normality' and 'body acceptance' (Gannon et al., 2011; Garland-French, 2016; Pheasant et al., 2020).

The second is the growing visibility and personalisation of prosthetics. Medical emergency is replaced by approaches that suggest a shift towards visible

identity through commercial, artistic and expressive forms of bodily expression that are recognisable in social settings (Julkunen, n.d.; Phelps et al., 2024; The Alternative Limb Project, n.d.).

The next is the increasing significance of body politics in future prosthetic bodies. The growing presence of visible-body design and body projects in public conversation, together with greater access to technology, suggests that visible prosthetics will increasingly be interpreted not simply in terms of function but also in terms of stigma, beauty, belonging and social acceptability (Garcia-Thornhill, 2008; Haines, 2013; OGDG, 2015).

Meanwhile, this review identifies a gap between current prosthetics research and future-oriented design inquiry. Current research primarily targets the three strands of rehabilitation, engineering and aesthetic customisation, but some practices show that prosthetics can also be used as expressive and disruptive objects (Sancini et al., 2015; Sanchez et al., 2016). Fewer studies have examined, however, how the social attitudes that will emerge in the future could change the significance and public acceptance of visible upper-limb prosthetics, particularly for young adults. Further, there are other forms of play: posthuman theory, disability studies and speculative design all have pertinent perspectives, but they are not always directly connected in research. The project is therefore based on a gap in Design Futures concerning the potential impact of visible upper-limb prosthetics not only as designed things, but also as socially constructed and publicly negotiated bodies (Dunne and Raby, 2013; Haines, 2012; Rensvogn and Voigt, 2021).

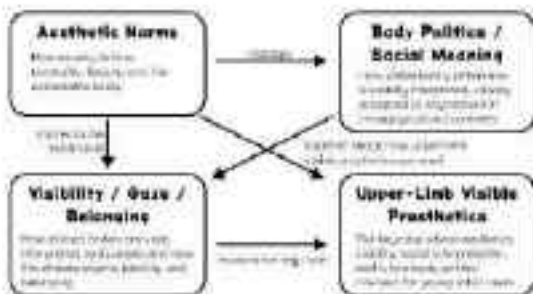


Figure 1. Conceptual and thematic map linking aesthetic norms, body politics, visibility, and upper-limb visible prosthetics.

3. Problem Framing

The Challenge

Building on the literature and practice review, the challenge is to understand how increasing prosthetic visibility may reshape public interpretation and bodily acceptance, rather than assuming that greater visibility or customization will automatically reduce stigma. The project focuses particularly on how these changes may be experienced by young adult users.

Why It Matters

This challenge matters because it expands beyond prosthetics alone and speaks to broader questions of body politics, social acceptance, and bodily diversity (Gertzel-Thompson, 2004; Gore, 1999). As more upper-limb prosthetics become more publicly seen and socially interpreted, norms around aesthetics, belonging, and bodily value are also likely to change (Gertzel-Thompson, 2004; UNYQ, n.d.; Owen Barakat, 2020; Phelps et al., 2004). If design research continues to treat prosthetics only as functional tools of repair, or only as objects of aesthetic customization, it risks overlooking

under shifts in how bodies are imagined and valued (Sanson et al., 2016; Dunne and Raby, 2013). This is especially important for young adult users, whose experiences may be more closely shaped by public perception, self-image, confidence, and belonging.

System-Level Perspectives

This project focuses on three interconnected system levels:

Human Level: how visible upper-limb prosthetics shape self-image, confidence, body perception, and belonging for young adults users (Clegg, 1999; Green and French, 2016).

Social and Cultural Level: how normalcy, beauty, ability, stigma, and belonging are constructed through social looking and cultural norms (Davis, 1982; Garland-Thomson, 2009; Goffman, 1983; Clegg, 1999).

Design and Technological Level: how prosthetic design, viability, and inclusion influence both body function and social meaning (Sanson et al., 2015; Phelps et al., 2024; Open Bionics, 2025).

These systems are interdependent, since bodies are never purely biological entities, but are continuously shaped through social and technological environments (Haraway, 1991; Garland-Thomson, 2011).

Temporal Scope

This project focuses on a long-term future extending over the next fifty years towards 2075. This timeframe allows the research to move beyond present-day prosthetic discussions and examine how attitudes toward invisible upper-limb prosthetics may reshape beauty norms, social acceptance, and body difference over a longer period (Dunne and Raby, 2013; Sanson et al., 2016).

Yoo et al., 2021). The project uses a bracketing rather than purely linear model of change: different attitudes may coexist or develop unevenly, rather than following a single progression from stigma towards acceptance.

Contextual Scale

The project mainly operates across micro and meso perspectives:

Micro Level: individual experiences of visibility, comfort, identity and everyday interaction among prosthetic users.

Meso Level: design culture, public visibility, social interpretation, and wider attitudes toward openness into visible prosthetics (VISA, 2025; Young V&A, 2021; Design Museum, 2013).

Macro Level policy forecasting is not the primary focus because the project is more concerned with how future body attitudes are expressed through designed objects, social interactions, and everyday life (Gardard-Thomsen, 2003; Dueno and Raby, 2013).

Framing Statement

This project therefore positions visible upper-limb prosthetics as a design research lens for exploring how future social and cultural change may reshape beauty, stigma, and bodily acceptance, especially for young adult users (Hartway, 1991; Gardard-Thomsen, 2005; Dueno and Raby, 2013; Holmes, 2012).

4. Design Futures Approach

The project is positioned primarily within Design Futures, as shown in Figure 3, with Strategic Foresight, Speculative and Critical Design, and Practice-Based

Design Research as its main supporting approaches. It also has a partial relationship with Transition Design, while Design Fiction and World Building provide secondary narrative tools. The project is placed towards the transformative side of the map because it questions how bodily difference is currently valued, but it is not as close to the centre because it does not propose a complete institutional or societal transition (Arghelescu, Christman and Lineström, 2017; Oursie and Rassy, 2013; Irwin, 2015).

My role as a design thinker is to act as a researcher, translator, and facilitator rather than to forecast one fixed future. I rely on elements of literature, practice, and signals to develop provisional social conditions and then test these conditions into scenarios, personas and material propositions and subject them to tests with participant perspectives. This means that the project can investigate the possibilities and implications that visible upper-limb prostheses can have for young adult users in the coming fifty years regarding beauty, stigma, and body acceptance (Sarland-Thomson, 2009; Barondieghand Vlasak, 2021).

Design offers a way to make abstract and sensitive questions about social attitudes tangible, visible and discussable. Assumptions that might be “hidden” in academic language can be revealed in visual, narrative and material forms, and so the audience compare possible futures (Kirkman et al., 2011; Stappers, 2014). However, specialized artefacts may overrepresent everyday experiences, reduce complex issues to aesthetic interpretation or reproduce the designer’s assumptions. They do not necessarily reflect future attitudes accurately nor are they necessarily representative of all users of a prosthesis. In that way, feedback from participants and evaluation by participants are required, but not sufficient to qualify the process as being completely co-designed (Baron and Frenck, 2022).

Strategic Foresight supports horizon scanning, weak signals analysis, and driver mapping, grounding the scenarios in identifiable patterns of change. Speculative and Critical Design support the questioning of existing body norms through alternative futures rather than producing a single solution (Dunne and Raby, 2013). Practice-based Design Research allows making, prototyping, and preotyping to generate knowledge through material exploration (Miettinen et al., 2015; Rautavaara, Farness and Mattar, 2020). Design Fiction and World Building help shape the scenarios in everyday life through personas and narratives. Transition Design is relevant only as a lens for longer-term cultural change because the project does not deal a full transition across policy, services, or institutions (Irwin, 2015).

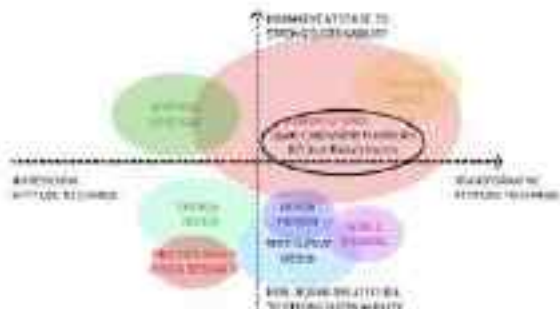


Figure 3. Design Futures profiling diagram for the JRP, locating the project primarily within Design Futures, and in relation to Speculative Design, Strategic Foresight, and Transition Design in the context of wider contemporary practices and future body norms.

5. Methodology

This project proposes a qualitative, future-oriented and practice-based methodology combining stake research, horizon scanning, weak signals analysis, driver mapping, personal scenarios building, prototyping and

participant feedback. This combination is appropriate because the project does not aim to measure prosthetic performance. Instead, it investigates how visible upper limb prostheses may be integrated within emerging social and cultural contexts, particularly in relation to beauty, stigma, visibility and bodily acceptance among young adult users (Danne and Fiebig, 2013; Garmentini and Unger, 2021; Kulkarni et al., 2011).

The project will use both secondary and primary qualitative data. Secondary data will include academic literature, design projects, exhibitions, talks, official websites and formal signals related to visible prosthetics, disability discourse, beauty norms, body politics and public interpretation. These materials will establish the theoretical, cultural and practice-based context of the research. Primary data will consist of textual, visual and audio responses to scenarios, cards and visual propositions gathered from prosthesis users, family perspectives and relevant expert or practitioner perspectives. The proposed sample will include 10-20 participants.

As shown in Figure 4, the first stage contains both research horizon scanning and weak signals analysis. Desk research will establish the theoretical and practice context, while horizon scanning will identify emerging changes in prosthetic representation, public representation and social attitudes towards bodily differences. Weak signals will be collected from artistic, journalistic and institutional examples that indicate possible changes in visibility, prosthetic identity and public acceptance. These materials will then inform the second stage: driver identification and mapping. The main drivers include visibility, beauty norms, stigma, social acceptance, access, disability discourse and body politics. Driver mapping will help organise the relationships between social, cultural, design and institutional forces rather than treating each factor separately.

The third stage develops three provisional scenario directions: visible prosthetics as objects of style and self-presentation, as utility empowered symbols, and as socially corrected body artefacts. Fictional future persons will situate these scenarios within everyday contexts. The scenarios will be grounded in the literature, signals and drivers, but will remain open to challenge. They will function as elicitation tools for participant research rather than as final findings. The preferred future will be developed later through comparison between the scenarios and participant responses.

The fourth stage uses prototyping and preotyping to translate the scenario into visual, material and narrative forms. Prototypes will communicate possible future conditions, while preotypes will intentionally encourage reflection, disagreement and critical response rather than only demonstrating a future product (Stappers, 2014; Ninkovic, Fortuna and Mattok, 2025).

A visual questionnaire and semi-structured participant conversations during the fifth stage collect the qualitative feedback. Participants will be provided with project information, and informed consent will be obtained, following which they will view identical provisional materials defining the scenarios. They will first respond to open questions concerning visibility, comfort, expression, social attention and acceptance, followed by prompts concerning the scenarios. With permission, conversations will be audio recorded or captured through speech-to-text, transcribed and anonymised using participant codes. Emails, recruitment messages, questionnaire responses, transcripts and records of design thoughts will be retained as evidence of the research process. Data collection will be considered sufficient when themes begin to recur across participant perspectives and additional responses no longer produce substantially new categories.

The material will be analysed through thematic analysis, moving from raw excerpts to descriptive codes, recurring tensions, key findings and design implications (Horton and Froese, 2022). Primary findings will be compared with the proposal-stage discourse, signals and drivers to identify confirmation, contradiction and new perspectives. These findings will then be used to refine the scenarios, personas and material prototypes. Participation will be voluntary, with thought to withdraw, anonymity and accessible participation formats. The process will be designed as participatory-informed rather than fully co-designed, because final decisions concerning coding, scenario framing and model-making will remain with the researcher.



Figure 4. Methodological framework for the JOP, showing the research process from data research, data analysis, and final outputs to learning, practice-based design experimentation, and feedback collection from young adult prosthetic users and prosthetic experts.

6. Critique Documentation

At the critique exhibition, I presented the current draft of Section 1.5, and together with a set of postcard, 3D image and one 3D object. The object is a prosthetic-style prosthetic hand from a well-known supplier, which I used to use this object to represent the visible, designed and culturally mediated body. These materials help me present the approach not only as written research, but also as a visual and spatial discussion about visible upper-limb prosthetics, body politics, and future body attitudes.

The feedback I received focus on two main points. First, tutors suggested me to identify which groups are my stakeholders and which stakeholders are most relevant to the project further, so that the proposal can be more specific about stakeholders, participants, and potential impact. In response to this feedback, I narrowed the project from prosthetics in general to upper-limb visible prosthetics, and identified young adult prosthetic users as the primary target group. Second, I was advised to continue looking at exact precedents and related works, at the same time ensuring that my own project does not imitate or copy theirs. The tutor emphasized that precedent research is important, but the project itself should maintain a distinct position and develop its own critical discourse. In response to this, I further clarified that the project is not primarily concerned with making prosthetics more aesthetically pleasing, but with exploring how future social attitudes might reshape their meaning in relation to beauty, stigma and bodily acceptance.



Figure 5. Critical evidence display for the BP proposal, showing the first draft report, posters, knowledge, and the prosthetic-style prosthetic presented as a 3D object.

7. Project Outputs, Stakeholders and Impacts

a. Project Outputs

The proposed outputs include a speculative installation supported by creative texts, fictional personas and preference-future visuals. Together, these materials will make alternative social interpretations of visible upper-limb prosthetics tangible and comparable.

b. Stakeholders

The most relevant stakeholders of this project include young adult prosthetic users, because this project talk about visibility, identity, stigma, self-expression and changing attitudes toward prosthetics directly (Garland-Thornson, 2009; Sullivan, 1993; Clow, 1990). A second important group includes prosthetic experts, practitioners, designers, and researchers working in prosthetics, wearable technology, speculative design and design fiction. A third group includes museums, galleries, culture, and wider public audiences interested in body politics, technology, and future social change (CCCB, 2015; V&A, 2023; Young V&A, 2021).

c. Potential Impacts

The potential impacts of this project are to expand how upper-limb prosthetics are understood beyond medical realm and to spark wider discussion about beauty, stigma, social interpretation, integration, participation, and bodily difference. Through speculative installation and supporting future materials, the project may challenge fixed assumptions about normality, beauty, and acceptable bodies, while also offering new perspectives for design and cultural conversations about how visible prosthetic bodies may be socially read, valued, and lived with in the future.

8. Personal Objectives

Through the IRP, I wish to deepen my understanding of robotic upper-limb prosthetics further not only as medical devices, but as cultural, aesthetic, and socially interpreted body objects. I want to strengthen my ability to connect theory, future thinking and design process, especially in speculative design, visual expression and installation-based research. At the same time, I also hope this project can help me move further toward a design research path related to body politics, future identities, and critical or speculative design while building new connections with people working in prosthetics, disability discourse, and cultural institutions.

9. Project Plan to the End of Programme



Figure 3. Project plan to the end of the programme, covering the stages, objectives, activities, resources, and milestones from May to final submission.

Part 2: IRP Realisation

10. Summary Statement

This project investigates the possibilities of living with, interpreting and socially accepting upper-limb prosthetics that are visible in everyday life in 2075. The

year 2016 was delayed because, in addition to technological changes, the project focused on public attitudes and cultural values, which may change gradually and reshape how visible body difference is interpreted over time (Dunne and Raby, 2013; Barendse and Veage, 2021).

A combination of desk research, scenario modeling, a visual questionnaire and initial engagement with prosthetic users, family members and expert perspectives was used. The results suggested a few key points: invisibility was not the primary aim of the participants, but they wanted to escape from being constantly noticed, questioned and socially managed by other people. The results also specified that visible style could be empowering, but could also create new pressures, expectations and judgments (Richard Harrison, 2020; Goffman, 1963; Dunne and Raby, 2013).

In response, three future scenarios are proposed in addition to a pessimistic future in which visible prosthetics remain present but do not always become the focal point of every interaction. Targeted primarily at young adult prosthetic users, the project also extends to family members, practitioners, disability groups and the general public. The outputs are scenario cards and visual material along with speculative prosthetic designs that will facilitate more sustainable, socially inclusive futures (Barendse and Veage, 2021; Slapnick, 2014).

11. Key Research Findings

The Team 2 research moved the project from proposal-stage thinking into practical testing and early synthesis. It involved initial participant interviews with prosthetic wearers, family members, and experts, as well as scenario cards and a visual questionnaire. This phase tried to determine what participants actually discussed about comfort, wear/attention, expression and

social acceptance in everyday life, as opposed to the claim made in the proposal phase that visible upper limb prosthetics have social significance. Transcripts and speech-to-text files of participant responses were analyzed and categorized into four areas of analysis that guided the making of narratives and the direction of the project (Garcia and Rallo, 2013; Raman and French, 2022; Steppers, 2014). Considered collectively, the findings evolved on several levels: the first redefined visibility as a social condition; the second and third concerned two different socially negotiated options for future prosthetic visibility; and the fourth took the issue beyond visibility and attention to participation, care and self-directed life.

The first key finding was that visibility was experienced here as a social condition that is a social condition. In multiple accounts, the challenge went beyond mere visibility— the nature of social space was often affected by the prosthetic's visibility. Participant K said that he had decided on a flesh-colored prosthetic and had even covered it with a thick sleeve because "I really didn't want too much attention" in the public and "part of it is the fast society" (Participant K, Appendix D3). Participant K similarly described how some people kept staring and how one was not just treated as 'an ordinary person', but as 'the person whose hand is different' (Participant K, Appendix D3). As the examples illustrate, visibility can be 'socially heavy' if it is associated with staring, discomfort and interpretive pressure rather than ordinary attention. This finding supports the worry that was expressed in the proposal stage of visibility and stigma, but expands on it to say that visibility in everyday life is manifested through atmosphere, attention, and social response (Garcia-Ramirez, 2019; Gutman, 1983).

The second key finding was that participants were not mainly seeking invisibility, but relief from interpretive burden. What came up over and over

again in the interviews was not a desire to have prosthetics go away; it was a desire not to have to deal with other people's reactions. From a family perspective, participant J noted this as the most important aspect to him naturally and not be stared at all the time (Participant J, Appendix D). Participant K similarly suggested that what mattered was not making the prosthetic disappear, but no longer having to 'manage other people's reactions' (Participant K, Appendix D). As these accounts suggest, the preference is not for concealment, but for prosthetic visibility without social cost. Placing this process in the context of the proposed research is itself above indicates that the value of social normativities is not that visible difference should be eliminated, but that it should be noted (Eliant-Thorson, 2015; Clare, 1996). This was a direct input to the project's preferable future direction and its focus on the 'interpretive burden'.

The third key finding was that expression did not substantially produce acceptance; in some cases, it simply shifted the form of attention rather than reducing it. At first, the *Wubie as Style* scenario seemed like a positive one, with the possibility that prosthetics had become more than a means-of-escape – they were forms of identity, taste, and self-expression. But this contemplation was complicated by participants' responses. Participant L commented that he appreciated the style direction and that he thought that prosthetics have an attitude and character, but also cautioned that when something becomes style 'people start to have expectations,' and that it could become 'a new standard against which you are judged' (Participant L, Appendix D). Participant D explained this tension through the example of a nose-piercing scar: if someone covers the scar with makeup, the visibility does not disappear; instead, the latter becomes the new object of attention (Participant D, Appendix D). This analogy helped people to understand that aesthetic change does not always lead to less attention. Although this discovery does not conflict with the project's interest in expressive futures, it presents some difficulties in that it

demonstrates that style and acceptance are not one and the same (Sanoeni et al., 2016; Blom and French, 2018; Rhoads et al., 2020). It served as firsthand input to the Visible or StyLe section and as input to later project decisions.

The fourth key finding was that the problem was not only how visible prosthetic bodies were seen, but how their possibilities were sometimes pre-empted by others in the name of care, protection, or normalization. Again as a member of a family, Participant J highlighted the significance of ordinary life and minimizing social discomfort, showing how family care can influence the way visibility is managed in everyday settings (Participant J, Appendix D3). Participant T built a new idea further by describing disabled students who liked celebrities, games, and sport like everyone else but who were placed in a setting with no running track and no basketball court because that would “attract” them (Participant T, Appendix D3). The example indicated that it is not just about public judgment, but also about potential limits on participation before people even begin, as well as limits on desire and self-expression. This reinforced the concern about stigma as the proposal stage, as another instance: social limitation is not overtly rejected but appears as a form of protection (Class, 1992; Garland-Thorne, 2011). This discovery paved the way for the project’s preferable future, as it focused not only on the question of over-attention, but also on ordinary participation—and self-directed life.

Taken together, these findings validate and add to the ECF proposal. The reiterates the above-mentioned discussion, which has stated that the social meaning of visible prosthetics depends on the politics of the body, stigma and social interpretation, rather than on function alone. Meanwhile, they create new angles because they suggest that participants were not just seeking invisibility or visibility, but more visible forms of public interaction that excretion could bring pressure along with empowerment, and that normalization was not necessarily seen as a desire to make visible difference

discrete. They also show that the issue extends beyond visibility to whether prosthetic users can participate in ordinary life, express desire and make self-directed choices. These findings revealed that what mattered was not visibility per se, but the social situations in which it became more or less visible. These were then used as the foundation for the three scenarios and the preferable future that was drawn up for them (Clark and Floty, 2013; Gaverdigi and Varga, 2017).



FIGURE 7. ANALYSIS OF HOW THE INFORMATION GATHERED FROM THE WORKSHOPS AND DESIGN THINKING PROCESS WAS TRANSLATED INTO KEY RESEARCH INSIGHTS, WHICH THEN INFORMED THE PROVISION OF COHERENCE AND WIDER PROJECT DIRECTION.

12. Project Development

The development of the project from the idea to early outputs is summarised in figure 8. It started off with a broad interest in prosthetics, posthuman bodies, and future notions of beauty, and focused specifically on upper limb prosthetics and their young adult users within the realm of the visible. The role of participant engagement, visual experimentation, and listening to narratives moved the project from a vague conception of aesthetics to participant-driven issues of conflict, over-attention, expression, empowerment, and ordinary

participation. The main takeaway was the unphysical process between the just raw evidence, the extraction of patterns, and the formulation of insights, which helped to articulate how the participants' responses to the proposed scenarios indicated the project's initial output domains (Dunne and Raby, 2012; Rasmussen et al., 2011).

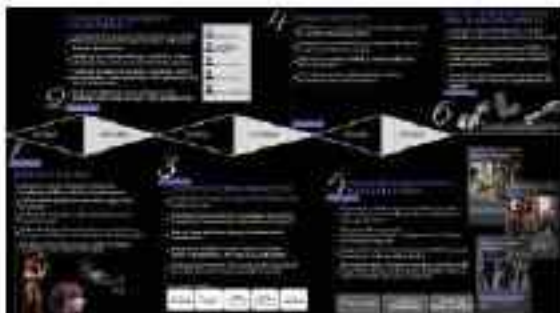


Figure 8. Six-stage project flowchart diagram showing how the project evolved from initial learning to participant engagement, analysis, insight formation, scenarios translation, and early social direction.

13. Audience

The primary audience of the project are young adults who use visible upper limb prostheses, since they are directly impacted by the social problems, interpretations and participation issues captured within the research. Their experiences are most directly related to the project's central question, and they directly influence its preferable future.

Secondary audiences identified in the responses included family members and carers, who affect the way in which users manage their visibility in the context of care, protection, and "natural life", as well as prosthetic professionals and

design practitioners who affect how future prosthetics are designed, talked about and supported. The wider public forms the context in which prosthetic bodies are viewed, understood and overlooked as users navigate daily life. Some disability-related institutions and organisations also have a role to play, as they can assist in advocacy, in dissemination, and in popular understanding.

Participant evidence indicated that users talked of over-attention, discomfort and interpretive burden in public life; family perspectives spoke to care and ordinary living; and expert/insider perspectives raised issues of style, expectations and participation. This project thus writes not only *how* living with a visible prosthesis but also *how* those who shape, respond to and interpret them in everyday life (Gardner-Thompson, 2005; Clark, 1995; Hansen and French, 2002).



Figure 3. Research map showing the project's primary, secondary, and wider audiences as defined through participant evidence on visibility, care, interpretation, and everyday participation.

14. Complexity Map

Two complementary maps that reflect the complexity most relevant to the project are used in this section. The project does not trace the entire technical design procedure, the detailed pathway for restoration and the entire "process-making process." Rather, it involves the social and structural factors that influence the everyday meeting, support, and lived experience of the visible upper-limb prosthesis (Cartano-Thomson, 2009; Currid and Raby, 2013).

Figure 10 is a larger driver map that places the visibility phenomenon of upper-limb prostheses in relation to the wider political, economic, social, technological, legal and environmental context. It subdivides three broad complexity clusters into the visible. The first deals with changing attitudes towards visible physical difference as affected by stigma reduction, visibility in the media and public familiarity, and the discourse of body differences. The second is access, inclusion and rental everyday life infrastructure (and here participation, assistance in public spaces, prosthetic provision, inclusion, mobility, risk of being excluded by users). The third is the transition from novel to everyday: the symbolic and cultural significances may be increasing and prostheses can become more than just medical objects and can potentially be viewed as both culturally significant and as objects of desirous value. This transition is associated with customisation, self-expression and speculative design as well as with the tension the attention might not be reduced (Bainbridge and Usage, 2011; Sansoni et al., 2016).



Figure 10a: Design map showing the wider structure, conditions of shaping factors, interrelations of visible upper limb prostheses, including upper limb attributes, users with residual, and the user feedback to improvement.

Figure 10b: Illustrates four key dynamics of everyday interactions. The *visibility pressure loop* illustrates how the act of being visible in public spaces can bring attention, judgement and discomfort which can lead to less comfort and more hiding. The *compliance and normalization cycle* illustrates how the more visible prosthetics are accepted, the more comfortable users feel using them; this leads to familiarity and further normalization. The results of the *lesson pathway* indicate that a series of style and customization can relieve introduction and confidence; at the same time, it can also elicit a series of reception, style assessment, and pressure. The *recess and choice loop* below illustrates users' choices among concealment, expression and efficient use, where price, types of prosthetics, and fit impact the users' ability to choose (Goffman, 1963; Garland-Thorneau, 2000; Phelps et al., 2024).

later, living life is lived through choice and display: choosing a prosthetic cover like jewellery or clothes, riding public transport and attracting immediate attention, and navigating work and social environments while having the prosthetic read as style, confidence and personal character. This scenario is based on expression, celebration and redirected attention. As it demonstrates, visibility can be empowering but can also create new judgements and pressures.



Figure 1.1. Video as Empowered – a future in which visible upper-limb prosthetics are publicly admired as signs of strength, skill, and enhanced ability.

In *Visible as Empowered*, the future is lived through the experiences of Lisa, a 25-year-old prosthetic user whose visible prosthetic is often noticed in the public sphere. She is sometimes viewed with discomfort or pity, but more often as confident, strong, and inspiring. The prosthetic is a source of admiration, recognition and positive attention in public and social contexts and it is a symbol of pride, resilience, and symbolic strength. This scenario is grounded in the project's interest in future body politics and changing social values around visible difference. Yet it also creates a paradox: Positive attention does not necessarily create ease. When people admire someone with a prosthetic limb,

Together, these scenarios represent comparative futures. They were created to explore how various social conditions of visibility, recognition, interpretation and participation can possibly influence everyday life of prosthetic users. They are also the foundation for defining a preferable future, described in the next step (Gunn and Raby, 2013; Rammings and Waage, 2021).

18. Preferable Futures

This project attempts to come up with a proposal for the future, a condition of visible prosthetics that will be favourable from a social perspective. It is a preferable future not because of the lack of visibility, but because it means that even having to use a visible upper-limb prosthesis won't necessarily involve discomfort, judgement, explanation, or emotional work. It is a future in which prosthetic bodies appear but are not necessarily perceived as special or socially disruptive. Rather, they are increasingly interpreted as a normal part of our lifestyles, our daily routines and our lives as members of society.

The proposed preferable future directly addresses the project's main question – namely, how the use of visible upper-limb prostheses might potentially impact beauty, stigma and body acceptance in future social settings. The studies indicated that visibility is not only a visual state but also a social one that is a matter of attention, interpretation, and response. The research also indicated that the participants were not primarily seeking invisibility but relief from constant attention. In this regard the future suggested here is a socially livable one in which people can use prosthetics that are “visible but need not be managed” (Cove, 1989; Gordon-Thomson, 2019; Gunn and Raby, 2013).



Figure 10a. *Prostate Future* concept sketch showing a flexible future where a general population becoming more familiar, socially accepted, and confidently integrated into everyday activities, who to notice, and public life.

This future is particularly desired by young adult users of visible upper limb prosthetics, the project's target user group. For them, daily life can be defined by public attention, self-confidence, self-image and social inclusion. A more socially normalised future reduces excessive attention while allowing visible difference to remain present. It is also preferable for families and carers, as it creates a lower burden of protection, anticipation and access management. But for more general audiences and support systems this future is better, as it lessens the impulse to think of the visibility of this bodily difference as anything but normal. It puts this place circumstances in which daily life is not about coping with discomfort, curiosity, or www.ashm.co.uk.



Figure 12a. City of everyday participation scenarios showing visible products of thinking problems in public the artwork becoming the center of attention or explanation.

However, this future also has limitations. While normalization can help to diminish stigma, it can also make visible differences invisible, or remove room for additional difference or “more expressive identities.” It also does not completely address affordability problems, access to prosthetics, or cultural attitude issues. In this context the “preferable future” presented here is not a definitive conclusion, but rather a suggestion for the next phase where it can be further designed, tested, and discussed. It is preferable, not because it excludes tension, inequality and difference, but because it makes the existence of the prosthetic life more visibly viable (Davis, 1995; Gaudet-Thomson, 2011; Karmstroff and Vodge, 2021).

17. Theory of Change

The Theory of Change of this project is not focused on the technological improvement of upper-limb prostheses themselves, but rather on changes to

how prostheses are imagined, depicted and socially understood, it does not promote a desire for visibility to disappear or a complete embrace of invisibility; it calls for visible prosthetic lives to become more socially livable.

The intervention points of the project work on four interconnected levels. First, it aims to disrupt the automatic reading of visible prosthetics by imaginatively reframing public interpretation and challenging automatic responses of curiosity, pity or demands for explanation. Second, it focuses on making lived futures legible by creating scenarios, using personas and visualizations to understand what these scenarios would 'feel' like for different stakeholders in everyday life. Third, it strives for a new way of talking about prostheses beyond repair, beginning with/with them in terms beyond function and appearance, introducing context, participation, social meaning, and interpretive burden into the discussion. Fourth, it seeks to stimulate stakeholders' discussions on the effects of visible prosthetic life, concern not only users but also family members, designers, practitioners, organizations and the wider public.

In this change pathway, the IIMP outputs are not considered final technical solutions, but rather representational and communicative acts. Set scene cards, personas, installation elements and preferable future visuals translate research findings into forms that can be seen, corporeal and discussed. The outputs make abstract social issues visible and enable a deeper dialogue with stakeholders beyond the project who shape the representational and understanding of prosthetics in society.

The project thus expects that the process of change is not quick and progressive but slow and gradual. In the short term, the project aims to beg these issues, bring them to attention and fuel late discussion, particularly on invisibility, the interpretive burden and the boundaries of style and

utilization as means of acceptance. The scenarios and visual materials might be used in the medium term for teaching, in a workshop/exhibition or to inform social discussion in an organisation. The project's long-term goal is to help change the lens through which visible prosthetics are viewed, so that they are seen not as deficient, exceptional or a spectacle, but as part of a larger diversity of ordinary bodies.

The preferable future scenario is thus not that of invisibility, but rather a more socially normalised condition of visible prosthetic life. In this future, visible difference remains present, but reduced in negative function, ordinary participation, and self-directed life become more possible. The project does not claim it can create this future alone, but it seeks to contribute towards it by changing how visible prosthetic bodies are represented, discussed, and collectively imagined.

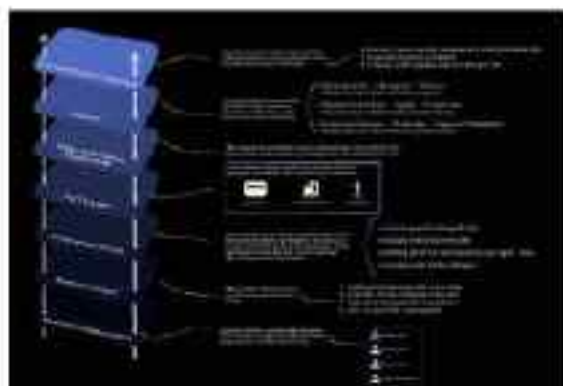


Figure 15. Theory of Change diagram showing how personal stories might be translated into intervention points, IRP outputs, intermediate engagement, and goals.

visions...and long-term issues, leading toward a more socially normalized and socially viable condition of visible prosthetics.

13. Outputs and Dissemination Strategy

The final outputs of the project consist of three speculative upper-limb prosthetic models representing the project's comprehensive future scenarios: *Visible as Style*, *Visible as Empowered*, and *Visible but Socially Controlled*. Rather than functioning as medical prototypes or predictions of future prosthetic technology, the models memorialize different social conditions surrounding visible prosthetic life. They were presented as part of a wider exhibition system that also included a research poster, a printed booklet, scenario publications, participant quotations, and a QR-coded response survey. Together, these outputs translated the project's research into physical, visual, and narrative forms that enabled audiences to engage with the findings in different ways.

Each prosthetic model was developed directly from one of the project's scenarios and corresponding research findings. The *Style* model investigated issues of personalization, decoration, aesthetic agency, expectations and judgement that might arise when prostheses become something fashionable and a means of self-expression. The *Empowered* model embodied confidence, pride and public attention, and drew attention to societal expectations that prosthetic users appear "strong" or "inspirational". The *Socially Controlled* model adopted a more exposed and mechanized visual language to represent unstable public interpretation, including curiosity, admiration, dissection and stigma. Perceived as full-fledged specimen objects, the models offered a material and spatial encounter with issues of visibility, bodily difference and public attention, beyond a purely textual approach.

The poster, booklet and participant quotes linked the models to the results and experiences in order to illustrate the social dynamics of each scenario.

audiences. Together, the exhibition materials were designed to support different stakeholder groups. Prosthetic users and family members could reflect on whether the scenarios reflected recognizable experiences of visibility, care, and participation. Prosthetic practitioners and designers were encouraged to consider how aesthetic and material decisions influence social interpretation beyond functional performance. Wider public audiences were invited to reflect on their own role in prototyping attention, judgement, assimilation, or normalisation in everyday encounters with visible prosthetic bodies.

Beyond NCAM2020, the project could be disseminated through a portable exhibition and facilitated scenario workshop for disability organisations, prosthetic clinics, universities, design institutions, and public cultural programmes. The exhibition could be adapted into a toolkit combining the prosthetic models, scenario cards, discussion prompts, participant guidelines, and a digital response platform. This format is appropriate because the project aims to encourage dialogue rather than deliver a fixed technological solution. The success of future dissemination should therefore be demonstrated not only through exhibition attendance, but through evidence that the outputs support dialogue, encourage more inclusive interpretations of visible prosthetic bodies, and are reused as tools for future discussion, education, and participatory design.

13. Reflection

This RFP developed through a sharpening of the social and cultural challenge established in the proposal. From the beginning, the project treated visible upper limb prostheses as cultural and socially interpreted body artefacts, focusing on beauty, signs, belonging and bodily experiences rather than technical performance. The key shift was the movement from the conceptual

level of visibility to the participant-based perspective of visibility in everyday life. Beauty standards and aesthetics were initially at a broad level. The interviews made them more specific by identifying dining, over-attention, the interpretive burden, care-less imitation and ordinary participation. Terms were thus described through participant experiences, as well as through literature and precedents, and fed into the final scenarios.

Within the proposal, I named the project in Design Futures, alongside Speculative Design and Strategic Foresight and partially in relation to Transition Design. This continued to be revised, except that the equilibrium shifted. The 50-year time horizon was set, and changes in visibility and beauty norms were explored through horizon scanning, weak-signal analysis and driver mapping. Once primary research began, speculative and practice-based approaches became more central because they allowed participant insights to be translated into scenarios and material propositions. Transition Design remained less developed. Although the project produced a Theory of Change, it did not test an implementation pathway across policy, service or institutional systems. It therefore remained mostly at micro and meso levels: everyday experiences, public interpretation and design culture (Angheloiu et al., 2017; Davis and Riley, 2018).

The methodology followed much of the process proposed in Part 1, but became more iterative. Dark research established a critical foundation, while the visual quantitative and participant conversations tested whether the scenarios were possibly resolvable. While useful for talking about the abstract future, the pictures within the conversations could also have skewed participants towards, and invited aesthetic comparisons of, categories I had given. Interviews made it clear that participants did not strictly want to be invisible, but wanted to be relieved of the burden of dealing with other people's responses. Several iterations emerged through transcript review and thematic

coding, but the selection of frames was based on my interpretation. Several experiences were omitted from scenario construction process. In some cases, they mirrored material in other scenarios; a few scenarios overlapped in terms of style, admission and societal attention (Hansen and French, 2022; Rasmundsgaard and Vinge, 2021).

The work reflected the proposal critique, as well. At that time, I used postcards, a hero picture and a found prosthetic-practice hand. The critical position became more clearly defined and sketchboards were better defined as a result of the tutor's feedback. The lecture to emphasize young adult users of upper-limb prostheses and to shift from my symbolic found object to future purpose-built scenario models. The final installation explored the use of the proposed methods (speculative installation, scenario materials, personas and preferable future scenario) alongside providing greater emphasis on physical prototyping.

A key challenge of the project was that it was not co-designed but rather participant-informed. Findings were influenced by prosthetic users, family members and expert perspectives, but I retained a great deal of control over the coding process, the framing of the scenarios, and the choice of materials, model-making and interpretation of the exhibition. This could potentially be interpreted as me inserting my own visual perceptions in relation to lived experiences. A deeper co-design process would have included partnerships in shaping and challenging scenarios, constructing visual languages, choosing quotations and making decisions about how to represent the preferable future. Co-design does not involve asking for permission once the design is done; it involves co-agents setting, co-interpretation and co-authorship, and decisions about formats, informed consent and just wages (Hansen and French, 2022).

The three full-scale models on mannequin forms were the first point of contact for the RGA2026 exhibition. The explanation was provided by the poster, booklet, scenario publications and participant questions and a QR-linked response activity. My intention was to get people to look beyond what caught their eyes, think about social conditions, and compare the experience by seeing which actual conditions appeared most familiar. The material differences between the scenarios and the printed materials relating to the featured models worked well. This facilitated my goal of connecting theory, futures thinking, visual presentation and installation-based research (Mockman et al., 2011; Blaygiew, 2014).

But it turned out that there was a contradiction at the heart of the exhibition. The project argued for visible prosthetics to exist without becoming the centre of attention, yet the exhibition relied on visually striking forms to attract visitors – the display had to draw attention to itself through bold shapes. The Style model could clearly be a fashion item, and the Encumbered model can continue to expect a form that disabled people should appear strong or inspirational. The mannequins also kept the models away from the usual surroundings. Despite the efforts to limit interpretation with the booklet and the poster, the reader of the objects could not be fully managed. However, in assessing reception, there was also a need to assess visitor responses as systematically as participant interviews when making claims of impact. In the future, a display should consider more explicit comparative practices, participant explanations provided with context and recorded in some way, and the use of everyday or folkloric conversations.

The project was narrowed down to various factors such as engineering performance, ethical rehabilitation, manufacturing feasibility, trans-ethnic users, children's experiences and macro-level policy. Though these restrictions had the effect of narrowing the breadth, they did make the search for young adult

experiences and social interpretation more focused. There are still some limitations: sample size, lack of regard for race, gender, class, and culture, and a horizon of 2075 which is far off.

Through the project, I came to understand my role as a design futurist as a researcher, translator and facilitator rather than a predictor. My responsibility is to make assumptions and alternative futures tangible while keeping them open to disagreement. The next step would be a multi-stage co-design programme with a more diverse group of prototypic users, followed by workshops with family members, practitioners, occupational therapists, disability-led organisations and cultural institutions. Partnerships with the Ladies Association and the Alternative Leds Project could support recruitment, advice, guidance and dissemination. The project could then develop into a reusable dialogue and co-design toolkit.

26. Professional Futures

Through this RFP, I became more certain that I want to develop a research-led design practice connecting future technologies, body politics and public engagement. This project also deepens my understanding of what co-design is: it is a most creative thing, and it should not be formulaic or limited to producing a interpret aslation. Methods must recognise context, and design can challenge assumptions, expose contradictions and create space for discussion. This is especially important when working with disability, bodily difference and such complex social and cultural issues, because visually attractive outcomes may still simplify lived experience or impose new expectations. In future, I hope to work in design research, speculative design or exhibition practice, while strengthening my skills in co-design and facilitation. I will interpret Design Futures as a way to make alternative futures visible, not to define and predict them.

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Appendices

Appendix A. Annotated Literature and Practice Review

1) A1. Literature sources

Norming, L.E. and Vignat, P.S. (2021). Speculative design so thought experiment. In: A. The Journal of Design, Economics, and Innovation, P. 31, pp. 374-402.

Summary: This article presents speculative design as a form of thinking experiment. Rather than predict the future, it uses hypothetical object and scenarios to provide reflection on ethical, cultural, and technological consequences, offering a framework for discussing the possible future.

Clark, A. (2005). *Natural Born Cyborgs: Man, Technology, and the Future of Human-Enhancement*. Oxford: Oxford University Press.

Summary: Clark's work argues that humans do not become cyborgs only after external technologies appear. We are naturally disposed to extend ourselves through tools, environments, and technical systems. Therefore, technological extension is not a departure from human nature but one of its defining features.

Devil, L.J. (1986). *Embodying Knowledge: Disability, Difference, and the Body*. London and New York: Yale.

Summary: Davis argues how the concept of "normal" emerged in modern Western society and argues that the "normal body" is not a natural fact but a historical product shaped by ableism, technobodilyism, nation-building, and systems of classification.

Therefore, disability is not simply an individual lack: it becomes visible through the power and exclusion of normalizing itself.

For my project, this text is important because it explains why visible prosthetics are often judged against an imagined standard body, and why future bodily norms may continue to reproduce hidden logic of normalization.

Garland-Thompson, H. (2002). Integrating disability, transforming feminist theory. *NADA Journal*, 16(2), pp. 1-22.

Summary: In this essay, Garland-Thompson argues that integrating disability into feminist theory does more than add a new topic: it reshapes how we understand location, difference, representation, and power. She shows that body difference is not only a medical issue but is deeply entangled in social structures and cultural norms.

For my project, this text is valuable and important because it moves prosthetics beyond a functional or technical frame and puts them within broader body politics. It helps me think of visible prosthetics not just as devices, but as cultural objects that challenge visibility and social norms.

Garland-Thompson, H. (2008). Feminist disability studies. *Signs: Journal of Women in Culture and Society*, 33(2), pp. 1017-1027.

Garland-Thompson, H. (2008). *Staring: How We Look*. New York: Oxford University Press.

Summary: In this essay, Garland-Thompson references "staring" from a rude social act into a key way of understanding how body difference enters public visual culture. She argues that bodies that are not naturally strange, they become marked through relations of looking.

The meaning of visible prosthetics does not come only from design, but also from how they provoke curiosity, judgment, and classification. This book helps me understand prosthetic visibility not merely as a visual condition, but as a question of interpretation and belonging.

Garland-Thompson, H. (2017). *Melting: A feminist manifesto against the color of "brown"*. *Protein*, 26(2), pp. 391-403.

Goffman, E. (1986) *Stigma: Notes on the Management of Spoiled Identity*. Englewood Cliffs, NJ: Prentice-Hall.

Summary: Goffman explains how stigma is produced in everyday interaction, drawing from certain body traits, identities, or differences become socially read as damaged or deviant, affecting self-perception and participation. His focus is not the body itself, but the social process through which difference is become negative valued.

Hanssens, D.J. (1991) *Working machines: Science, technology, and cyborg identities in the late twentieth century*. In Hanssens, D.J. (ed.), *Cyborgs and Women: The Remaking of Nature*. New York: Routledge, pp. 103-121.

Summary: Hanssens presents the cyborg as a hybrid figure that smudges stable boundaries between human and machine, nature and technology, body and system. Her concern is not only technology itself, but how hybridity disrupts conventional ideas of identity, gender, and subjectivity.

For my project, this text is important because it provides a theoretical basis for understanding the body as something other than a naturally complete unit. It also helps me situate prosthetics within a broader discussion of nature/body, where prosthetics are not only compensatory tools but possible starting points for redefining bodily limits and aesthetic imagination.

Hayles, K.B. (2004) *How We Became Posthuman: Virtual Bodies in Cyberspace, Literature, and Work*. Chicago, IL: University of Chicago Press.

Summary: In Hayles's work, she posits how developments in cybernetics, information theory, and digital culture have reshaped the human into a relation between information and embodiment rather than just a purely flesh-based subject. She critiques the tendency to privilege information over the body, while insisting that embodied self systems. It situates prosthetics within a larger posthuman framework. Prosthetics are not simply external add-ons to the body; they can also function as interfaces through which information, networks, and embodiment are reorganized, challenging conventional understandings of bodily wholeness and human identity.

Shaw, B., Macfarlane, A., Muladymov, J.R. and Burt, A. (2015) The aesthetic appeal of prosthetic limbs and the money value: The role of personal characteristics in decision. *The national journal of Design*, 2(1), pp. 67-81.

Summary: This article directly points at the social appeal of prosthetic limbs and questions whether greater realism is always preferable. The authors show that

prosthetic appearance is not a secondary decorative issue, but something that shapes emotional response, acceptance, and perception for both users and observers.

Schwarz, S., Spier, L., Mochizuki, A. and Bui, A. (2016) *Heedless of Obsolete Objects: From modular objects to a work of design*. In F. J. O. S. and J. F. J. (eds) *Artificial Engineering*. Volume 2. *Open Challenges*, pp. 19-32.

Summary: This chapter explicitly argues that prosthetics can be understood not only as medical equipment, but also as works of design. The authors emphasize that aesthetic design relates to emotional experience, self-image, and social interaction, means prosthetics should not be evaluated through engineering and functional alone. This is crucial for my project because it supports the idea that visible prosthetics are cultural and aesthetic objects rather than just purely assisting tools. It also helps make prosthetics within broader discussions of expression, consumer culture, and future body imagery.

Stebins, T. (2012) *Dorothy Kautzman*. Ann Arbor: *UM University of Michigan Press*.

Summary: Stebins argues that disability is not outside aesthetics, as an exception or exception, but it can actively challenge and reshape dominant standards of beauty, wholeness, and value. He suggests that body's difference is modern art and visual culture should not be merely as lack, but as a force that generates new aesthetic judgments.

This is valuable for my project because it offers a positive framework for thinking about visible prosthetics. Prosthetics do not need to disappear into a "normal" body; their visibility, difference, and designed form may instead participate in redefining future aesthetics.

2) A2: Practice sources

Wiktoria Mioduch / Crystal Leg

Type: Performance / prosthetic design / body exploration

Summary: Crystal Leg, developed through Wiktoria Mioduch's collaboration with The Alternative Link Project, transforms the prosthetic from a hidden medical aid into a highly visible, performative body component. Rather than imitating a natural limb, it uses crystal materiality, sculptural form, and stage presence to turn the prosthetic into a medium of identity, power, and aesthetic expression.

Links:

Type: Commercial prosthetic design / watercolor / jewelry design

Summary: LIMB uses 3D-printed prosthetic, custom-to-fit prosthetic appears on every feet standardized medical equipment and toward our possible subjects of personal style. By emphasizing fit, sight, and individuality, it allows users to choose patterns, structures, and visual languages based on their own preferences rather than accepting purely functionalist aesthetic design. This is highly relevant to my project because it shows that visible prosthetics have already entered the consumer design and identity expression. Prosthetics are no longer only compensatory devices, but also media for visibility, taste, and future aesthetic means.

Ulfoss — Third Agent

Type: Performance art / body extension / technological artifice /

Summary: Third Agent is one of Orlan's most iconic body extension projects: a mechanical "third hand" attached to the right arm and more by remote signal. It is not just designed to replace, but to add a new organ and movement system to the body. This is highly relevant to my project because it shifts the body away from a medical logic of lack and repair toward a technological logic of addition and extension. It suggests that bodies may not able to extend to control, but instead redefine form, capacity, and body's imagination through extra components and organ.

Kel Harrison — Antenna

Type: Cycling art / sensory augmentation / body interface

Summary: Kel Harrison's Antenna is a sensory augmentation system that converts colour into vibration through the skin, allowing her to "see" both visible and invisible colours, including infrared and ultraviolet. It is important because not in replacing a lost function, but in adding a new sensory channel to the body.

Blaze Riley — Solaris Sense

Type: Cycling art / sensory extension / technological interface

Summary: Blaze Riley's Solaris Sense connects her body to an online seismic sensor system, allowing her to perceive earthquakes anywhere on the planet in real time and translate that sensation into sound or dance performance. The project shifts the body to planetary-scale data, turning it into a real personal biological system into an interface for receiving Earth's signals. This is important to my project because it shows how the extended body can become a data-enabled body, which means technology not only extends movement and sensation, but also redefines the relationship between the body, environment, the planet, and space.

Young / SA / Third Arm

Type: Museum education / patient representation / design integration

Synopsis: Here prosthetics presented by the V&A as a public design case not only because it is a prosthetic case, but because it is a prosthetic (i.e. a public narrative about design, inclusion, imagination, and accessibility). The V&A materials highlight its lightweight, customisable design and its low-cost and openable children, with workshops use it to encourage young audiences to rethink bodies and creativity.

Design Museum – Designs of the Year 2017 / Future Dots

Type: Exhibition / social design / prosthetic innovation

Synopsis: The Design Museum's *Designs of the Year 2017* placed prosthetics at work within a public exhibition framework about design as a form for social change. Its teaching notes highlight Not Impossible Labs' work in South Sudan, where a 3D printing prosthetics lab enabled ongoing local production of prosthetic limbs. This is useful for my project because it shows that prosthetics are not framed only at the individual level, but are also translatable in education contexts into narratives of social innovation. It presents prosthetics as matters of public value, technology and shared future imagination, not just medical repair.

CO2B exhibition – HUMAN: The future of the species

Type: Exhibition / speculative future / future body discourse

Synopsis: This exhibition explored the future of the human species through themes such as enhancement, technological experiences, human-machine hybridity, and ethical boundaries. It situates body modification within a broader social and species-level future rather than just having simply been a purely medical or product issue.

QinetiQ / MAGI Bone-Controlled Prosthetics

Type: Neuroprosthetics / medical technology / future prosthetic systems

Synopsis: QinetiQ's materials show its involvement in advancing MBN, an implanted muscle-reading system that wirelessly transmits muscle signals to a bionic prosthetic for more natural control. The company also alludes to the rapid growth of neuroscientific and prosthetics controlled by mind.

Age Hacking – Transhumanism

Type: Speculative design / future body modification / ethical design

Synopsis: This project presents modified body forms imagined as answers to future medical, environmental, or social mobility problems. As for the less obvious than in pushing viewers to confront the risks and limits of accepting future body modification.

Appendix B: Signals

1) B1: Signal: Increasing visibility and customization of prosthetics

Trend: From medical necessity to visible self-expression

Relevance: Supports the project's focus on how visible upper-limb prosthetics are increasingly understood as aesthetic, identity-based, and culturally meaningful body objects rather than only medical devices.

Sources: LBNL post; Protopost (2020); The Prosthetic as Cultural Object (2018)

2) B2: Signal: Growing public discussion of visible bodily difference and prosthetic identity

Trend: From functional assistive device to socially meaningful artifact

Relevance: Supports the project's focus on changing a stigmatized social view of visible, disabled, and assistive appearance, especially in relation to how upper-limb prosthetics are interpreted in public and cultural contexts.

Sources: Richard Thompson (2019), USA (2019); Young (2019); CCCB (2019)

3) B3: Signal: Growth of speculative projects exploring future meanings of prosthetics and body difference

Trend: From repair to future social and cultural negotiation

Relevance: Supports the project's future-oriented exploration of how visible upper-limb prosthetics might be differently valued, accepted, or regulated through changing bodies, minds, body politics, and bodily acceptance.

Sources: Hansen (2019); Dumez and Raby (2016); Skarabog and Young (2019)

4) B4: Signal: Prosthetics entering wider cultural and exhibition discourse

Trend: From clinical device to cultural and design object

Relevance: Supports the project's interest in how visible prosthetics are publicly interpreted through design, identity, inclusion, and social meaning beyond medical contexts.

Sources: V&A (2020); Young (2019); Design Museum (2015); CCCB (2019)

Appendix C: Ethics Checklist

This project is designed to be ethically robust, meaning that it fully means all the speculative involvement: assessing prosthetics, anthropomorphism, and future body extension. It prioritizes informed consent, respectful representation, and secure data management. The

project does not aim to substantiate a transactionable utility offering, but to examine how future social and technological changes may reshape public utilities' current practices and operational features.



Figure 1. Screenshot of the HPA Ethics Checklist, showing the project has been identified as a public utility project.

Appendix D. Evidence of research and design

D.1. Research question narrowing

The research question evolved through three stages:

It started with a broad question: How can the utilities to provide power develop and move from the current of heating fuels to the world of augmentation, innovation, and energy although it has technological and social context? This initial focus focused on providing energy and had a close relation to posthuman bodies, mechanisms, artificial intelligence, and environments enhancement (Haraway, 1981; Huhns, 1985; Lissner, 2016).

Subsequently it was narrowed down to two sub-questions: How could artificial bodies be made, outside of the medical context, (mediators of future body, identity and environment adaptation) and their social and environmental change resulting from people perceive normalized or augmented bodies? This project was preoccupied with future body politics, the work with emerging of the grid (Haraway, 1981; Hughes, 1988; Huhns, 2015).

Finally, the research question was narrowed to its essence: How would the ways of changing utility bodies, utility governance practices in the future reshape perceptions of a body, status, and body acceptance in a world of users? This last question brought the project to a general investigation of anthropocentrism and asked bodies to a more posthuman, socially based investigation of mobility, utility network and and experimentalized practices (Rohrer, 2002; Oram, 1998; Davis, 1996).

Future flow might attend to forward predictions about how “expanding flow” in augmenting, expressive, and body augmentation inform technological and social evolution?

To flow, might predictions of how body medical devices (e.g., institutions of future body design and environmental adaptation)?

How may AI and environmental change reshape public perceptions of non-medical or enhanced bodies?

To flow, might future attention toward bodily appearance predictions, representations of identity, stigma, and bodily appearance during young adult years?

Figure D1. Development of the research questions from a broad investigation of aesthetics, posthuman bodies and enhancement towards a focused study of visible upper limb prosthetics, young adults, bodily stigma and bodily appearance.

2) D2. Research communications tools



Figure D2. Early version of the elements made developed during the project phase, presenting visual future scenarios for visible upper limb prosthetics to serve participatory research and scenario refinement.



Figure D3. Final version of the survey to be used, revised through participants' informed consent to adjust questions around vignettes, introduction, order questions, order questions and combined participant information.

Questionnaire link from Typodotme: <https://typodotme.com/6v45LdU33A>

Contact Lindsey Anderson:

Figure D4. Email correspondence with the Lindsey Anderson of the sending the original introduction, request for research support and the original data responses. The form and email information has been removed where necessary.

3) D3. Primary research evidence



Figure D5. Documentation of the role of primary participant research session, including who to record photographs evidence and handwritten notes recorded during the conversation.

No.	ID No.	Participant Type	Gender	Age	Activity / Role	Occupational Role	Notes
Prostheticians							
1	1A	Prosthetic User	Male	25	Student	Student	
2	1B	Prosthetic User	Male	25	Student	Student	
3	1C	Prosthetic User	Female	25	Student	Student	
4	1D	Prosthetic User	Male	25	Student	Student	
5	1E	Prosthetic User	Female	25	Student	Student	
6	1F	Prosthetic User	Female	25	Student	Student	
7	1G	Prosthetic User	Male	25	Student	Student	
Family Members of Prosthetic Users							
8	2A	Family Member	Female	25	Student	Student	
9	2B	Family Member	Male	25	Student	Student	
Work Groups in Prosthetics							
10	3A	Work Group	Male	25	Student	Student	
11	3B	Work Group	Female	25	Student	Student	

Figure D6: Averaged participant information for the six primary research participants, grouped as prosthetic users, family members of prosthetic users, and artists as designers working with prosthetics. Participants' names have been replaced by initials for privacy.

Appendix E: Project output

1) E1: Final Speculative Prosthetic Form Models



Figure E1: Various stylized speculative prosthetic form models, exploring popularization, artistic agency and feminist speculations that may merge when these prosthetics are integrative as objects of human and self-expression.



Figure E2. Volume and Weight of the prosthetic arm model, showing the internal structure and the pressure distribution on the prosthetic arm, showing the internal structure and the pressure distribution on the prosthetic arm.



Figure E3. Volume and Weight of the prosthetic arm model, showing the internal structure and the pressure distribution on the prosthetic arm.

representing animals such as the catfish through responses including curiosity, admiration, devotion and anger.

2) 63. Printed Scenario and Persona Materials



Figure E4. Printed overview and poster a suite presenting the three comparative studies (i.e. Mink et al. 2016, Mink et al. 2016a and Mink et al. 2016b). Each printed card contains one hour's worth of video corresponding to the comparative period to communicate how the study condition is experienced by everyday life.

3) E2. Booklet



Figure E5. Final printed booklet designed to guide visitors through the project's research context, participant informed findings, three comparative scenarios and preferable future (94/194).



Figure 10. Digital layout of the hospital poster job, showing the sequence and visual structure used to guide readers from the research question and strategy towards the conclusion and potential future.

4) E4. Posters



Figure 27. Four key-based research order representing the research timeline, methodology, key findings, comparative scenarios and preferential future direction.



Figure 26: First main visual poster communicated the project's central theme and visual identity in an accessible, visually accessible format.

Appendix F: RCA2026

f) F1: Exhibition Display



Figure F1. SCAD23 exhibition display showing the time-sensative clothes from models presented together alongside the project's supporting visual and printed resources.



Figure F2. This researcher and a co-researcher (not engaging with the process in front of the RCA2026 exhibition display).

2) F2-RCA2026 Exhibition Label



Figure 73. First RCA2005 evaluation using the project title and fielding of vision and project information using the College of William & Mary sample.

Appendix G. Public Documentation



Figure 81. Screenshot of the RCA2005 Shared Public website interface, displaying the project profile image, accessible off the main public facing project description.

