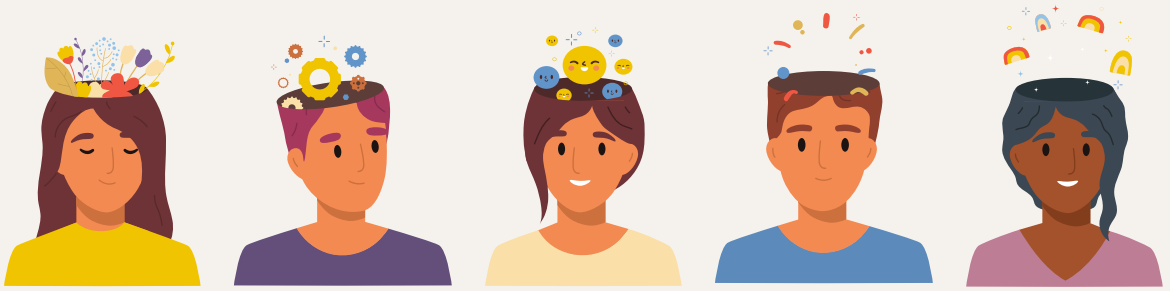

EMBRACING NEURODIVERSITY IN DESIGN TEAMS

Master Thesis Report

Design for Interaction

Delft University of Technology

Faculty of Industrial Design Engineering

July 2024

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Embracing Neurodiversity in Design Teams

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PREFACE

I am happy to present this thesis project, which explores the dynamics of neurodiversity within design teams and aims to foster inclusive collaboration. Throughout this project, I have immersed myself in the complexities of neurodiverse traits, learning from the experiences of students and educators, and designing a practical toolkit to enhance teamwork. This journey has deepened my appreciation for the unique cognitive styles that individuals bring to collaborative environments and the importance of embracing these differences.

As someone with a strong interest in teamwork, and inclusivity, I embarked on this project with a curiosity to understand how neurodiverse traits impact group work and how to create tools that promote understanding and collaboration. Working closely with my target group, their insights and feedback have been invaluable in shaping this project. This journey of learning and designing for neurodiverse teams has been challenging yet rewarding.

I would like to express my gratitude to my supervisors at the Industrial Design Engineering faculty of TUDelft for their invaluable support and for dedicating their time and expertise to this project. Their guidance and continuous encouragement have been instrumental in shaping both this project and my growth as a designer. I would also like to extend my thanks to the coaches, course coordinators, and academic counselors who participated in the interviews. Their contributions have made this project truly meaningful and reinforced its importance.

Special thanks to my peers and the master students who participated in the testing sessions. Their engagement and honest feedback were instrumental in refining the toolkit. Lastly, I want to acknowledge the support of my family and friends. Their patience, understanding, and encouragement kept me motivated during challenging times.

This thesis represents a significant milestone in my academic journey, and I hope it contributes to the ongoing efforts to embrace neurodiversity in educational and professional settings.

With heartfelt gratitude for the shared journey,

Aayushi Gupta

EXECUTIVE SUMMARY

This report presents the findings and outcomes of the project titled “Embracing Neurodiversity in Design Teams,” conducted as part of the Master’s degree in Industrial Design Engineering at TU Delft. The primary goal of this project was to develop a toolkit that helps design teams at TU Delft embrace neurodiverse traits, facilitating better collaboration and enhancing overall team effectiveness.

BACKGROUND AND MOTIVATION

In the Faculty of Industrial Design Engineering at TU Delft, students come from diverse backgrounds, bringing varied perspectives and cognitive styles. While diversity can drive innovation, it also introduces challenges in team dynamics, particularly when accommodating neurodiverse traits. This project aims to address these challenges by encouraging design teams to recognize and embrace neurodiversity, ultimately enhancing their effectiveness and inclusiveness.

RESEARCH APPROACH

The project began with a comprehensive literature review to understand the role of diversity and neurodiversity in design teams. Traits which a neurodiverse individual may possess was listed. This was followed by interviews with coaches, course coordinators, and academic counselors to gather practical insights into the challenges a neurodiverse teams goes through and how their strengths are accomodated. The interviews were also conducted to understand the strategies caches take to guide such teams.

KEY FINDINGS

After analyzing all the insights from the interviews and literature research, it was evident that there are several areas that need to be addressed to help design teams with neurodiverse traits work effectively and collaboratively. However, given the project timeline and context, it was not feasible to focus on all the above identified implications.

The focus was on addressing the clear communication gap among team

members within design teams. Misaligned expectations and a lack of understanding about each other's working style and challenges were significant problems. Moreover, it was essential to establish a safe and inclusive environment where team members can openly share and discuss their unique neurodiverse traits in a fun and engaging manner. Building such a space takes time, but it can be done by incorporating fun and interactive activities as a foundation (Smith, 2018).

DESIGN GOAL AND PROCESS

Based on the research findings, the design goal was formulated: **To build a shared language within design teams to facilitate conversations about neurodiverse traits in a safe space**. Based on the design goal a toolkit was developed, which includes trait cards, puzzle pieces, and prompt cards aimed at facilitating meaningful conversations. The iterative design process involved testing the toolkit with design teams and refining it based on their feedback. Participants appreciated the toolkit's engaging and supportive approach but highlighted areas for improvement, such as enhancing the clarity of instructions and refining the prompt cards.

CONCLUSIONS AND FUTURE RECOMMENDATIONS

The final design of the toolkit successfully facilitated discussions about neurodiverse traits, helping teams understand and leverage individual strengths and challenges. However, further refinement is needed to enhance its effectiveness. Future work could focus on integrating the toolkit into the entire course duration, ensuring continuous support for neurodiverse team members, and exploring additional prompts to enrich discussions.

This project underscores the importance of acknowledging and embracing neurodiversity in design teams. By fostering an inclusive environment, design teams can harness the full potential of their diverse members, leading to more innovative and effective collaborations.

TABLE OF CONTENTS

01

INTRODUCTION

This chapter sets the stage for the project by introducing the topic, target group, approach, purpose and aim. It outlines the significance of neurodiversity in design teams and presents the overarching goal of fostering inclusive collaboration among team members.

In the world of design teams, diversity has long been recognized as a crucial element for innovation and success. Numerous studies have consistently demonstrated that teams consisting of members from diverse backgrounds, including different genders, nationalities, and areas of expertise, tend to outperform teams that lack such diversity (Page, 2007). By incorporating a variety of perspectives, experiences, and thinking styles, these teams excel at problem-solving and generating new solutions (Phillips, 2022). However, while progress has been made in embracing various forms of diversity, such as gender and cultural background, there is still an opportunity to include another type: neurodiversity.

Neurodiversity, a term coined by the Australian sociologist Judy Singer in the late 1990s, promotes the idea that neurological differences, like autism are natural variations of the human brain rather than disorders. Neurodiversity respects and appreciates the individual ways in which people process information, think, and perceive the world (Miller, 2024). Just as biodiversity is crucial for a thriving ecosystem, neurodiversity is essential for a vibrant and innovative society. The concept is that there is no one "right" way for the brain to function. Instead, there exists a diverse range of ways in which individuals perceive and react to the world, and it is important to embrace and encourage these differences (Miller, 2024). Understanding and acknowledging such neurodiverse traits is vital for creating inclusive environments, not only for individuals with neurodiverse traits, but also for the benefit of the wider community.

Design teams have a significant role in shaping products, services, and experiences in today's dynamic world. By recognizing the importance of diverse perspectives within these teams, this project aims to explore the intersection of neurodiversity and design. By embracing neurodiversity within design teams, we can tap into a vast potential for creativity, problem-solving, and innovation (Austin, 2021). However, neurodiversity is often neglected as an aspect of diversity. This presents both a challenge and an opportunity: a challenge to overcome biases and barriers, and an opportunity to fully harness the diverse range of human thinking styles. The goal of this project is to bridge this gap by encouraging design teams to embrace neurodiversity, ultimately enhancing their effectiveness and inclusiveness for better collaboration. This project aims to create a tool that enable and support e team members to feel comfortable discussing their diverse cognitive styles and feel valued and acknowledged.

Ultimately enhancing the effectiveness and inclusiveness of each team member in the design teams, leading to better collaboration and innovation. By developing strategies and tools that facilitate open communication and mutual understanding about neurodiverse traits, the project seeks to enhance team dynamics and overall performance.

The ideal target group for this project is the master student design teams of the Faculty of Industrial Design Engineering, TUDelft. These teams consist of students from diverse cultural backgrounds, nationalities, and educational disciplines, bringing a range of perspectives and experiences. However, while there is an emphasis on diversity in terms of gender, nationality, and educational background, there is still a lack of awareness regarding neurodiversity within these teams. Many team members may not fully recognize or understand their own and their team members' neurodiverse traits, limiting their ability to leverage these differences and tackle challenges for improved collaboration.

In this project, a comprehensive approach was followed, combining both empirical and theoretical research methods. Firstly, a literature study was conducted to establish a theoretical foundation, followed by interviews with coaches and course coordinators who provide guidance and supervision. Their extensive experience and insights offered valuable perspectives on coaching diverse teams and the challenges and opportunities related to fostering collaboration. Additionally, research through design approach, designing and developing prototypes to gain insights and generate new knowledge was followed (Stappers & Giaccardi, 2017).

This thesis project aims to shed light on enhancing awareness and inclusivity of neurodiverse traits among design teams. Despite the known benefits of diversity in terms of creativity and problem-solving, neurodiversity is often overlooked by design teams.

02

BACKGROUND

In this chapter, a comprehensive literature review is presented, exploring the concepts of design teams, diversity, and neurodiversity. It highlights the costs and benefits of diversity in design teams, and delves into specific traits of neurodiverse individuals, providing a solid foundation for the subsequent research. The chapter begins by stating the key research questions that guided the literature review, aiming to uncover how neurodiversity impacts teamwork and collaboration.

The literature review for this project was driven by several key questions aimed at understanding the role of neurodiversity in design teams. These questions were formulated to guide the research and form a solid foundation for the project:

What is the current understanding of diversity in design teams?

What strategies have been effective in fostering inclusivity and collaboration in diverse teams?

How does cognitive neurodiversity affect group work?

What are the characteristics (strengths and challenges) of a neurodiverse individual?

How are neurodiverse design teams guided?

To gain a deeper understanding of neurodiversity and its impact on the functioning of the design teams, the research started with the investigation of existing literature on the topic- 'Design team and diversity' and 'Design team and neurodiversity.' The research continued with uncovering the costs and benefits of working in a diverse team and how the benefits outweigh the costs. Furthermore, the study covered the examination of cognitive neurodiversity, focusing on how various neurodiverse traits influence team dynamics and recognizing that everyone lies somewhere on the neurodiversity spectrum. Through this research specific traits, both strengths and challenges were identified to see how these traits affect collaboration and effective teamwork in design teams.

2.1 DESIGN TEAM AND DIVERSITY

In the Industrial Design Engineering faculty of TUDelft, students come from various parts of the world, bringing with them a wealth of diverse backgrounds. These backgrounds include different gender, nationalities, and areas of expertise. The design teams in the faculty are mostly formed keeping the diverse nature in mind, therefore the literature review started with this conventional form of diversity. This was beneficial as it helped in understanding how these diverse perspectives and experiences contribute to the dynamic of a team.

BENEFITS OF DIVERSITY IN DESIGN TEAMS

Studies have consistently demonstrated that diverse teams outperform homogeneous ones in terms of creativity, innovation, and problem-solving abilities (Page, 2007). When individuals with diverse backgrounds, skills, and perspectives come together, they are better equipped to address complex design challenges and create innovative solutions that appeal to a wider range of users (Phillips, 2014). Below are a few benefits of a diverse design team:

- **Enhanced Creativity and Innovation:** Diverse teams bring together individuals with unique backgrounds, experiences, and perspectives. When people collaborate across different disciplines and cultures, they generate innovative solutions that would not otherwise merge in homogenous groups. Such diverse teams challenge exclusive practices and like-mindedness (Asmal et al., 2022). This blend of ideas sparks creativity and encourages the exchange of fresh insights, leading to breakthroughs that might not occur otherwise.

- **Improved Problem Solving:** Inclusive teams approach problems from various angles. By considering a wider range of possibilities and potential solutions, they arrive at more effective problem-solving strategies. Diverse groups challenge assumptions and encourage critical evaluation of options. This diversity of thought prevents groupthink and ensures that decisions are well-rounded and robust (Gaither et al., 2017).

- **Better Decision Making:** In an inclusive environment, team members avoid falling into the trap of group thinking. They critically evaluate options, weigh different viewpoints, and consider a variety of perspectives (Phillips

et al., 2008). As a result, their decisions are more informed and less likely to overlook important factors. By embracing diversity, design teams enhance their decision-making processes.

- **Increased Productivity and Performance:** When employees feel valued and respected in an inclusive workplace, they engage more fully in their work. In turn, this engagement leads to improved productivity and overall performance. Inclusive environments foster a sense of belonging, which positively impacts employee morale and motivation (Asmal et al., 2022).

- **Understanding of Customer Needs:** Design teams with diverse backgrounds have a good understanding of different customer needs. Their valuable insights allow organizations to tailor products, services, and marketing strategies effectively. By incorporating diverse perspectives, companies can successfully meet customer demands and adapt to changing market trends. Ultimately, diversity promotes trust in the work among potential customers from diverse backgrounds and increases their inclination to interact with the product (Sierra-Mercado & Lázaro-Muñoz, 2018).

Diversity brings fresh perspectives and fosters innovation; however, it also presents challenges. Biases, stereotypes, and preconceptions can hinder the recognition and advancement of underrepresented groups. Overcoming stigma requires education—raising awareness, promoting inclusivity, and encourage everyone to appreciate diversity and understand its positive impact (Asmal et al., 2022).

Overcoming stigma is important as when overcome, the innovation potential of diverse perspectives can flourish. It's important because groups that aren't represented well often come up with innovative ideas, but those ideas don't always help them succeed in academia. Their unique viewpoints lead to novel solutions and scientific breakthroughs. This creates a paradox where diversity leads to innovation but doesn't always lead to success for the diverse groups (Hofstra et al., 2020; Homan, 2019). Recognizing and rewarding diverse contributions is essential, beyond academia as it has broader societal implications. Diverse teams drive progress, solve complex problems, and contribute to a more inclusive world.

COSTS OF DIVERSITY IN DESIGN TEAMS

Although the benefits of having a diverse design team are unquestionable, it is equally crucial to acknowledge the difficulties that accompany such diversity. Working in a diverse team with unfamiliar individuals is not always smooth; it presents its own set of challenges. Tim Harford's book "Messy: The Power of Disorder to Transform Our Lives" talks about a few of these challenges as mentioned below (Harford, 2018).

- **Communication Challenges:** Diverse teams may face communication barriers due to differences in language, cultural norms, and communication styles. Misunderstandings can lead to inefficiencies and delays in decision making.

- **Conflict and Tension:** Diverse perspectives can lead to disagreements and conflicts within a team. While healthy conflict can drive innovation, excessive tension can hinder collaboration and productivity.

- **Time and Effort:** Building and maintaining a diverse team requires time and effort. Recruiting from a broader talent pool, promoting inclusivity, and addressing biases demand resources and commitment.

- **Resistance to Change:** Some team members may resist change when faced with diverse viewpoints or new ways of doing things. This resistance can slow down progress and hinder adaptation.

- **Socially Uncomfortable:** Team members of a diverse team often feel socially uncomfortable in voicing their opinions. They doubt their answers as they are afraid of being judged. This makes the interaction awkward, and they do not enjoy the process while working in a diverse group.

However, these costs are often outweighed by the benefits of diversity. Research consistently shows that diverse teams outperform homogeneous ones in terms of innovation and problem-solving, as mentioned in section benefits of diversity in design teams.

2.2 EDUCATION ABOUT DIVERSITY IN A TEAM

To fully utilize the advantages of diversity in design teams, it is crucial to educate team members about the complexities and possibilities of working with diverse perspectives. One method explored in the literature is implementing generative conversations guided by Theory U (Hays, 2016). Theory U, developed by Otto Scharmer, provides a framework for deep reflection and transformation, enabling teams to move from superficial interactions to deeper, more meaningful conversations. This theory is particularly relevant for fostering collaboration and innovation in diverse teams.

THEORY U AND ITS APPLICATION

Theory U consists of six successive actions/stages that guide individuals and teams through a transformative process. This method emphasizes a deep, reflective journey that progresses from initial co-initiating to final co-evolving, fostering change within the team. Each stage is crucial and builds upon the previous one, ensuring a comprehensive and effective approach to team development and problem-solving (Hays, 2016). See figure 1 to get a better understanding of Theory U. The six stages are:

- **Convene:** This initial stage involves creating a safe and open environment where team members can freely share their goals and aspirations.
- **Observe:** Deep observation and listening to understand the current reality from multiple perspectives. Activities in this stage include empathy mapping and active listening exercises.
- **Reflect:** A period of reflection where team members connect with their deeper sources of inspiration and motivation. This helps in aligning personal values with team objectives.
- **Act:** Prototyping and experimenting with new ideas and solutions. This iterative process allows teams to refine their approaches based on feedback.
- **Harvest:** Embedding successful prototypes and new practices into regular operations, ensuring long-term sustainability and integration.

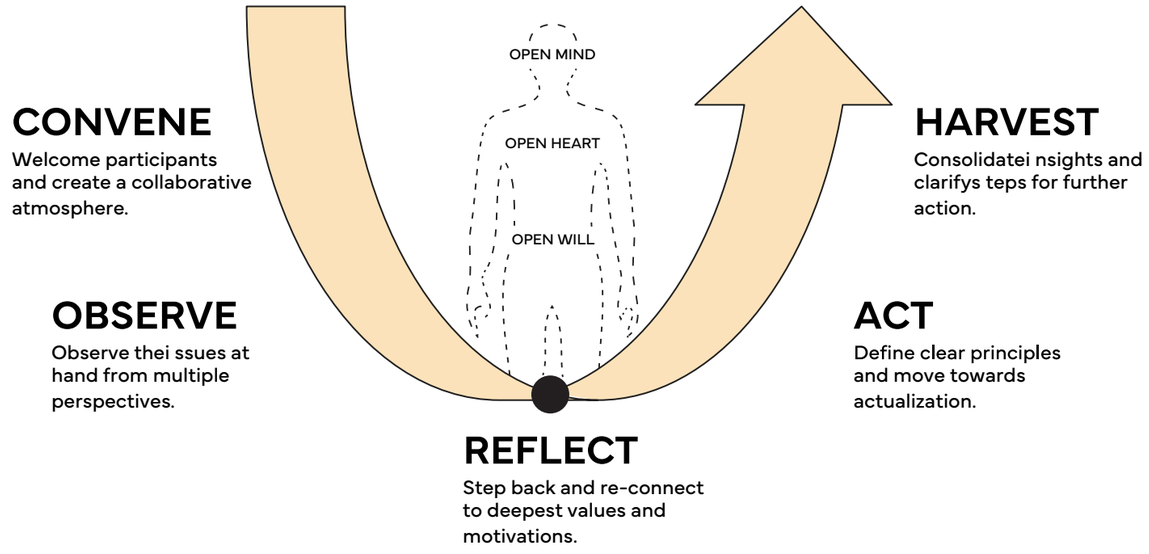


Figure 1: Theory U, developed by Otto Scharmer.

Theory U emphasizes the importance of approaching each stage with an open d, heart, and will. These elements play critical roles at different stages of the process, helping to ensure that participants are fully engaged and receptive to change:

- **Open Mind:** Crucial during the initial and final stages, an open mind helps participants to embrace new perspectives and possibilities during the Convene and Harvest phases. It allows them to remain receptive to new information and insights, laying the groundwork for deep understanding and integration.
- **Open Heart:** Essential in the middle stages, an open heart fosters empathy and emotional connection during the Observe, Reflect, and Act phases. This openness helps team members to connect deeply with their own motivations and those of their teammates, fostering a collaborative and supportive environment.
- **Open Will:** The will becomes particularly important during the Act phase, where prototyping and experimentation require commitment and a willingness to take risks and embrace uncertainty. An open will ensures that participants are ready to act on their insights and take meaningful steps towards transformation.

Together, these elements ensure that the Theory U process is not just a mechanical sequence of actions but a deeply human journey that engages the full spectrum of cognitive, emotional, and volitional faculties.

CASE STUDY:

GENERATIVE CONVERSATIONS FOR DEALING WITH DIVERSITY

In the paper "Dialogue for Design Teams: A Case Study of Generative Conversations for Dealing with Diversity," the authors applied Theory U to facilitate generative conversations within design teams (Persaud, Prakash, & Flipsen, 2021). This study's design team was culturally diverse and faced many challenges such as communication issues, conflicting perspectives and lack of trust during their project. These issues hindered their collaboration and the project. To address these challenges, the authors employed the Theory U framework and facilitated generative conversations, active listening, and reflective sessions.

Thie approach allowed the team to enhance their communication skills and value each other's unique contributions, leading to more effective collaboration. The team did not enjoy as much in the project initially, but towards the end they understood the importance of a diverse team. Such generative conversations facilitated better articulation of thoughts and understanding of diverse viewpoints.

By integrating the knowledge of Theory U into the framework of generative conversations, design teams can effectively navigate the challenges posed by diversity. This approach caters to the immediate project needs and fosters long-term cultural and organizational change. The goal is to transform diversity into a source of strength and innovation. By prioritizing the establishment of a safety net and facilitating opportunities for team members to build relationships, design teams can fully leverage the diverse talents within their team. This, in turn, will drive innovation, creativity, and overall success.

2.3 DESIGN TEAM AND NEURODIVERSITY

After examining the various aspects of diversity within design teams, it is important to focus on a specific and often ignored aspect: neurodiversity. While gender, nationality, and cultural background are commonly recognized dimensions of diversity, neurodiversity offers a distinct chance to improve creativity, problem-solving skills, and overall effectiveness of design teams (Page, 2007; Phillips, 2014).

NEURODIVERSITY EXPLAINED

Neurodiversity, a term coined by Australian sociologist Judy Singer in the late 1990s, challenges societal norms regarding neurological differences among people. It is rooted in the belief that certain neurological conditions, like autism, are natural variations of the human brain rather than disorders as previously thought. The neurodiversity movement, a social movement that lacks full scientific support, has emerged to promote understanding and acceptance of this diversity. Its goal is to facilitate the inclusion of individuals with diverse neurological traits in all aspects of society. It rejects the notion that neurotypical cognitive styles (i.e., cognitive, affective, and sensory functioning that aligns with the perceived norm in the general population) are the standard and instead celebrates diverse cognitive styles as valuable components of the human experience. This movement emphasizes that being neurodivergent is not inherently negative and challenges the prevailing idea that neurotypical cognitive styles are the ideal. Neurodiversity is defined as the diversity or variation of cognitive functioning in people. Everyone has a unique brain and therefore different skills, abilities, and needs (Exceptional Individuals, 2023b).

According to Garland-Thomson (1997), neurodiversity encompasses a wide range of neurological variations, which can be grouped into three main categories: neurological, cognitive, and mental health-related. Neurological variations refer to conditions that affect the structure and function of the nervous system, such as Tourette's syndrome and epilepsy. Cognitive differences encompass diverse thinking and learning styles, as seen in Autism Spectrum Disorder (ASD), dyslexia, and Attention Deficit Hyperactivity Disorder (ADHD), which is often referred to as Attention Deficit Disorder (ADD) in adults. Mental health-related variations involve conditions that affect emotional well-being, such as anxiety disorders, depression, and bipolar disorder. While all three types contribute to the overall concept of neurodiversity, this research

primarily focuses on traits or characteristics that specifically cater to cognitive neurodiversity.

CHARACTERISTICS OF ASD, DYSLEXIA, AND ADHD

ASD, still commonly known as "autism" is a neurological developmental condition characterized by repetitive patterns of behavior and difficulties with social communication. Individuals with autism may struggle with dealing with change, following mandatory actions, or understanding other points of view. These challenges are inherent in this unique learning difference (Exceptional Individuals, 2023b). On the other hand, individuals with ASD often exhibit unique strengths, such as keen attention to detail, heightened abilities in pattern recognition, and remarkable listening abilities (Happé, F., & Frith, U., 2009). Figure 2 displays an overview of the common strengths and challenges an autistic person may possess.

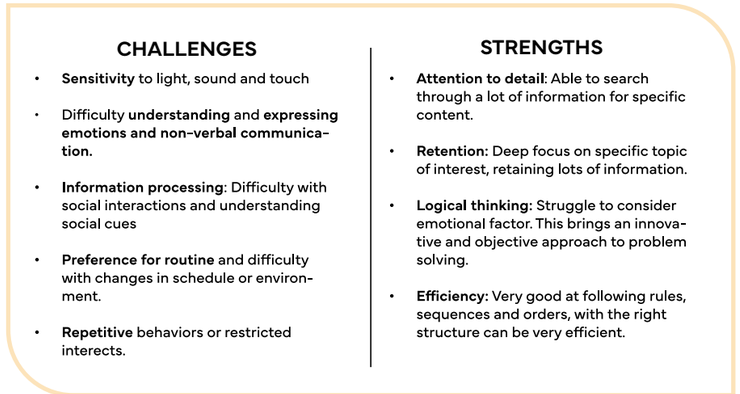


Figure 2: Common strengths and challenges an autistic person may possess.

ADHD is a condition categorized by challenges in attention, hyperactivity, and impulsivity. Scientifically, ADHD is identified by ongoing patterns of inattention and hyperactivity-impulsivity that make daily tasks challenging. People with ADHD typically struggle to stay focused, control their actions, and manage their energy levels, which can make it difficult for them to perform tasks that require high levels of attention. Despite these challenges, individuals with ADHD often exhibit qualities that are considered positive in today's society: they are creative, full of energy, and have a unique way of thinking (White, H. A., & Shah, P.,2006). Figure 3 displays an overview of the common strengths and challenges a person with ADHD may possess.

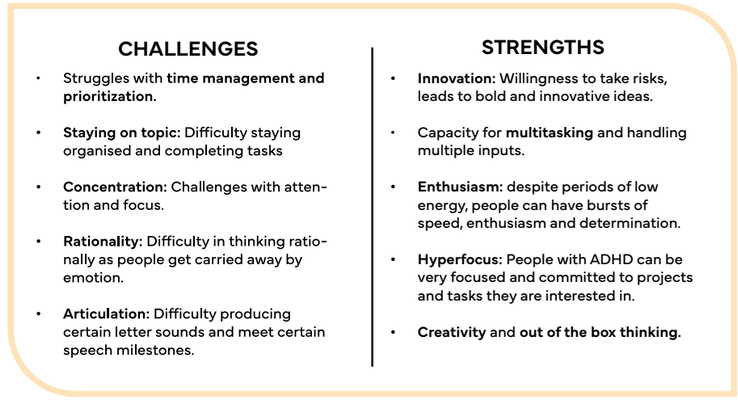


Figure 3: Common strengths and challenges a person with ADHD may possess.

Dyslexia is a cognitive condition that affects reading, spelling, and writing, often unrelated to intelligence. People with dyslexia might have trouble with reading words/numbers, recognizing certain words, and spelling correctly. This can make it more difficult for them to read easily and understand what they are reading (Shaywitz, S. E., & Shaywitz, B. A.,2008). Despite the challenges, individuals with dyslexia often exhibit strengths in various other cognitive domains, such as problem-solving skills and creative thinking (Shaywitz, S. E., & Shaywitz, B. A.,2008). Figure 4 displays an overview of the common strengths and challenges a dyslexic person may possess.

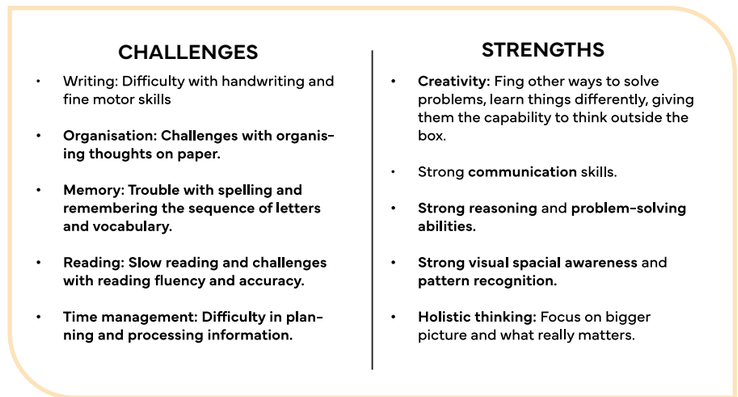


Figure 4: Common strengths and challenges a dyslexic person may possess.

2.4 CONCLUSIONS AND PROJECT IMPLICATIONS

After examining the unique characteristics—both strengths and challenges—associated with conditions such as ADHD, autism, and dyslexia, it becomes clear that these traits greatly contribute to the diversity of thought and innovation within design teams. However, it is important to recognize that neurodiversity is much more extensive. Each has their own cognitive style and way of processing information, making everyone neurodiverse. Labeling individuals with specific conditions can unintentionally continue stigma and reinforce negative stereotypes. Research has shown that neurodiversity, much like biodiversity, is crucial for a thriving ecosystem of ideas and creativity (Page, 2007). Embracing this concept allows us to appreciate and leverage the full range of cognitive diversity without the limitations of labels. By understanding neurodiversity as a natural variation in human cognition, we can create an environment that not only fosters inclusivity but also encourages the unique contributions of all team members.

Moreover, the stigma associated with terms like ADHD, autism, and dyslexia can lead to discrimination and exclusion, undermining the potential of individuals who possess these traits (Hays, 2016). By moving away from specific labels and viewing each team member as part of the neurodiverse spectrum, we can reduce stigmatization and create a more supportive atmosphere. This approach aligns with the principles of neurodiversity, which highlight the value and strengths of neurological differences (Miller, 2024). Ultimately, by avoiding labels, the project aims to cultivate a team culture that values diverse cognitive abilities, promotes mutual respect and dialogue, and enhances collaboration (Austin, 2021).

From now on, the project will no longer categorize individuals based on specific conditions such as ADHD, autism, or dyslexia. Instead, all traits, both strengths and challenges will be considered part of the broader spectrum of neurodiversity. This inclusive approach recognizes that everyone has unique ways of thinking and processing information, which can contribute to the team's success. By focusing on neurodiverse traits rather than diagnostic labels, the project aims to create an environment where all team members feel valued and understood for their unique contributions.

This change in approach aims to reduce the stigma often associated with specific conditions and to promote a more inclusive and supportive team dynamic. By acknowledging that everyone falls somewhere on the neurodiversity spectrum, we can better appreciate the diverse cognitive abilities within design teams. This will help to create a more collaborative and supportive environment where team members' strengths are recognized and leveraged and helping them overcome their weaknesses.

Figure 5: Traits of a neurodiverse individual

2.5 KEY TAKEAWAYS

- Diversity is beneficial as it fosters innovation and improves overall team performance
- While diversity has its costs, the benefits far outweigh these costs, leading to enhanced creativity and problem-solving.
- Creating a safe and open environment is crucial for facilitating understanding and collaboration within teams.
- Neurodiversity refers to the variation of cognitive functioning in people. Everyone has a unique brain with different skills, abilities, and needs.
- The project will focus on neurodiverse traits rather than diagnostic labels to reduce stigma and promote a more inclusive and supportive environment.

03

INTERVIEWS

This chapter provides an overview of the interviews conducted with coaches, course coordinators, and academic counselors of the faculty of Industrial Design Engineering. It discusses the methodology, participant details, and key themes identified from the interviews, helping in scoping down the project further.

The literature review provided a detailed understanding of diverse design teams and how cognitive neurodiversity affects group work. It highlighted the characteristics of neurodiverse individuals, outlining both their strengths and challenges. However, to complement the theoretical insights and validate their applicability, it was essential to gather practical, real-world perspectives. Therefore, interviews with coaches and course coordinators were conducted as they are responsible for guiding the design teams throughout the project.

3.1 PARTICIPANTS

The participants consisted of coaches, course coordinators and academic counsellors of the courses run at the faculty of industrial design engineering in TUDelft. The participants were recruited through online channels which involved sending emails inviting them to participate in a 30-minute-long interview. Participation was voluntary, and no compensation was offered. The Human Research Ethics Committee of Delft University of Technology approved the research activity and the involvement of the participants.

Overall, 7 participants contributed to the research, out of which four were course coordinators, two were coaches and one was an academic counsellor (see Table 1).

PARTICIPANT NO.	ROLE
1	Coach
2	Academic Counsellor
3	Course Coordinator
4	Course Coordinator
5	Coach
6	Course Coordinator
7	Course Coordinator

Table 1: Participant information

3.2 INTERVIEWS

The 30-minute, semi structured interview followed a script loosely, focusing on the main topics but with the flexibility of following the participants' natural thought processes and going deeper as they answered. For the interview script see Appendix B.

GOAL AND SCOPE

The goal of these interviews was to gain insights from coaches, course coordinators and academic counsellors about their experience of coaching diverse design teams. These insights are crucial for understanding the practical challenges a neurodiverse design team goes through and what kind of strategies are implemented to enhance the team dynamic and collaboration.

The interview focused on topics such as:

- Challenges encountered by students in team dynamics: Understanding the specific difficulties faced by students working in neurodiverse design teams, including communication barriers, conflict resolution, and the integration of various perspectives. This information was expected to be crucial for identifying common challenges and developing targeted interventions.

- Strategies, advice, and recommendations provided by coaches, course coordinators and academic counsellors: Identifying effective methods and practices employed by coaches and course coordinators to address the challenges faced by diverse teams. Understanding what has worked well in practice and areas for improvement was essential for the research.

- Identification and accommodation of strengths among team members: Exploring how coaches, course coordinators and academic counsellors recognize and leverage the unique strengths and capabilities of individual team members to enhance overall team performance. It was expected that creating an environment where everyone is valued would be crucial, acknowledging the uniqueness of each individual.

- Overall approach of coaches, course coordinators and academic counsellors towards successful team collaboration: Investigating the overarching philosophies and approaches adopted by coaches, course coordinators

and academic counsellors to foster a collaborative and inclusive team environment. Knowing these approaches will help in aligning the projects objectives.

By examining these aspects, the interviews aimed to get a deeper understanding of neurodiverse teams, bridging the gap between theoretical knowledge and practical application.

3.3 SYNTHESIS

The interviews were first transcribed (see Appendix C for detailed transcription) and then analyzed through thematic analysis (Sanders, EBN., & Stappers, PJ., 2012).

During the categorization process, each transcript was reviewed, and relevant segments of text were placed into categories based on the interview questions. This process helped in the identification of recurring patterns and themes across the interviews. The relevant segments of the text generated from the transcript were then clustered based on the topic.
Clustering the generated text resulted in more noticeable themes, making it possible to extract key findings. The thematic analysis not only highlighted the common challenges and strategies discussed by the coaches, course coordinators, and the academic counselor but also provided deeper insights into the dynamics of neurodiverse design teams.

THEMES

From the synthesis, several patterns have been identified, providing valuable insights into the dynamics of neurodiverse design teams. By analyzing the collected data from interviews with coaches, course coordinators, and an academic counselor, eight themes were formed. This qualitative research aimed to complement the literature by providing practical insights into the dynamics of neurodiverse design teams. The themes are supported by quotes from the participants, highlighting their experiences and perspectives.

THEME 1: Lack of focus on team dynamics in course structure

Coaches and course coordinators often have limited time to fully grasp team dynamics. Coaching sessions primarily focus on academic or project-related subjects, rather than delving into interpersonal relationships within the group. As a result, the chance to fully understand each team member's challenges and strengths is greatly reduced, making it difficult to address specific issues related to neurodiversity and collaboration effectively.

Participant 1 mentioned, *"I do not think we consciously do that"* highlighting the lack of deliberate effort to explore team dynamics during coaching sessions.

Participant 4 shared, *"I think often it takes a bit of time to elicit these things and because I was trying to catch all the teams, I didn't go into that direction."* This indicates that the broad scope of their responsibilities often prevents them from diving into the detailed dynamics of individual teams.

Furthermore, participant 5 stated, *"I meet my group after 2 weeks and that time I focus on the topic"* emphasizing the infrequency of meetings and the prioritization of project-related discussions over team interactions.

This pattern reveals a significant gap in the current coaching approach used in design teams. The lack of sufficient time spent on understanding team dynamics can result in the neglect of important issues, especially those that impact neurodiverse individuals.

THEME 2: Group conflicts due to communication gaps

Group conflicts often arise when there is a gap in communication among team members. These conflicts can arise from various factors, including the inability to effectively communicate needs and the difference in abilities to express concerns and expectations.

Miscommunications and misunderstandings can significantly impact the dynamics within a team. Participant 1 noted, *"There is this guy that is always trying to get out and then maybe the other student thinks he is not as motivated about the project or something. But the guy just needs fresh air to work again. If you just put it on the table and have an open conversation about*

it, I think that would be great."

The ability to openly express needs, concerns, and expectations is essential for fostering a collaborative and harmonious team environment.

THEME 3: Misaligned expectations within the design team

Misaligned expectations among team members are another source of conflict. Differences in goals, such as aiming for high grades versus just passing, or striving for perfectionism versus simply delivering work, can create tension and misunderstandings.

Participant 2hared, *"One student came to us coaches - these two members of the team don't do that much, and we are doing everything. And then after talking with the two who were not working so hard, we found out they were delivering work as expected. But the other two team members thought the quality was not good enough and they didn't put enough effort in. So, they redid everything. These two girls had a very high level of perfectionism and were not accepting the work from these two guys."*

This example illustrates how differing standards and lack of communication can lead to conflicts and misunderstandings within a team.

THEME 4: Promoting positive dialogue for conflict resolution

Coaches and course coordinators often intervene when problems arise within the group which need a third-party involvement, taking the time to listen to both sides of the story. Their aim usually is to steer the discussion in a positive direction, promoting mutual help and acceptance among team members. This intervention typically occurs towards the end of the project when the group is under pressure to complete their tasks and there is no other option but to collaborate.

Coaches and coordinators emphasize the importance of learning from each other and working together to overcome challenges. Participant 6 noted, *"Learn with each other because it can be helpful. So, to share and to work together with someone who doesn't have those skills yet."* This approach encourages team members to support one another and develop their skills collectively, fostering a more collaborative and cohesive environment.

Participant 3 highlighted the difficulties but also the necessity of working together: *"Challenge to work together - it will be slower and a bit frustrating, but you have to deal with it as a team."* This quote reflects the reality that collaboration can be challenging, yet it is essential for the success of the project and the development of the team.

By focusing on constructive communication and mutual support, coaches and coordinators help to transform potential conflicts into opportunities for growth and learning.

THEME 5: Personal challenges overshadowing group issues

In the context of design teams, individual level problems tend to be more common than group problems. These issues often include students missing classes or coaching sessions due to medical reasons or personal challenges. While some of these problems relate to group dynamics, many are specific to the individual and their unique circumstances.

Participant 5 noted, *"Student kept missing classes and this resulted in failing him because he kept repeating the bad behavior."* This highlights how recurring individual issues, such as attendance problems, can have significant consequences for the student's academic performance and contribution to the team.

Such individual problems may not always directly relate to group dynamics, their impact on the team should not be overlooked.

THEME 6: Encouraging participation in team dynamics

Within design teams, coaches and course coordinators often observe distinct roles emerging among team members. Typically, there is one person who is more reserved, potentially introverted or shy, and another who naturally takes the lead. Coaches recognize the importance of ensuring that all team members, including the quieter ones, have the opportunity to share their insights and contribute to the team's discussions.

Participant 1 noted, *"Some people take the lead, others shy or introvert. We give them space, opportunity to speak up because they have such valuable things to say. They are smart too, creative too and thus create a safe space."* This highlights the participants' efforts to create an inclusive environment where everyone feels comfortable speaking up.

Another participant mentioned, *"There is always a more silent person in coach meetings, so you ask them questions. People are not open, they are introverted."* This reflects the proactive approach taken by the participants to engage quieter team members by directly asking for their input and encouraging their participation.

THEME 7: Strategies implemented for enhancing team collaboration

Various strategies have been implemented within courses such as the UXAD (Project Usability and User eXperience Assessment in Design) course to foster a positive and collaborative team environment. These strategies aim to create a structured and safe space for students to communicate, reflect, and provide feedback to each other.

Participant 1, 3, 6 and 7 expressed that in the UXAD course, students are required to engage in several activities designed to promote teamwork and mutual understanding from the very beginning. On day one, students are asked to create and sign a team expectations contract. This contract outlines the roles, responsibilities, and expectations of each team member, helping to establish clear communication and accountability.

Additionally, students are tasked with writing an essay on "couch potatoes and hitchhikers," which serves as a metaphor for team dynamics, discussing the importance of active participation and the consequences of not contributing. This exercise encourages students to reflect on their own and their peers' contributions to the team.

The course also incorporates peer and team evaluations, conducted twice during the course. These evaluations provide a formal mechanism for students to give and receive feedback, fostering a culture of continuous improvement and mutual respect.

THEME 8: Creating a safe environment

The strategies implemented in the UXAD course aim to create a safe environment where students feel comfortable expressing their thoughts and feedback. This supportive atmosphere is crucial for effective teamwork.

Participant 7 noted, *"Let them give each other compliments,"* illustrating the importance of positive reinforcement in building a supportive team culture. Another mentioned, *"Team reflection in UXAD- talks about strengths"* highlighting the focus on recognizing and leveraging individual strengths within the team.

These strategies collectively aim to create a safe environment where students feel comfortable expressing their thoughts and feedback. However, the effectiveness of these strategies depends largely on how seriously students engage with the processes. Participant 6 reflected, *"This creates a safe environment for the students to give feedback to each other, but the coaches do not know how seriously it is done."*

While these strategies are well intentioned and provide a structured coaches have expressed uncertainty about the extent to which students take these activities seriously.

3.4 IMPLICATIONS OF THE THEMES

Following the key themes identified above, important implications for the project emerged.

- The limited time that coaches and coordinators have for understanding team dynamics and what happens among team members, highlights the need for more efficient and targeted coaching strategies. Currently, coaching sessions mainly focus on project specific issues, which leaves little room for addressing team related issues and the unique challenges and strengths of individual team members. Therefore, there is a need to adopt a more comprehensive approach that combines project-related guidance with a focus on team dynamics.

- The existence of communication gaps that result in group conflicts highlights the need for open and structured communication strategies to align expectations and motivations. When team members are unable to clearly communicate their needs and concerns, misunderstandings and conflicts are more likely to arise.

- Misaligned expectations among team members can create conflicts due to differing goals and standards, leading to tension and misunderstandings. To prevent frustration and conflict, it is important to establish clear communication of individual goals and standards within the team. Furthermore, it is crucial to understand and respect the motivations of each team member to foster a collaborative environment.

- Shifting towards positive dialogue early in the project is essential for neurodiverse design teams. By focusing on constructive communication and mutual support, potential conflicts can be transformed into opportunities for growth and learning. This approach will not only address immediate issues but also build a foundation for better teamwork throughout the project.

- The frequent individual level problems show how important it is to have a supportive and flexible approach when managing neurodiverse design teams. To deal with these issues effectively, it is crucial to understand and accommodate the unique needs of each student.

- Observing team dynamics and actively engaging quieter members highlights the importance of inclusivity in design teams. Creating a safe space where all team members feel valued and heard is essential for fostering an inclusive and productive team environment.

- Strategies like team expectation contract, peer evaluations and reflection exercises depend on how seriously the team engages with these processes. Ensuring active participation is essential for collaborative team environment.

3.4 CONCLUSION

After analyzing all the insights from the interviews and literature research, it is evident that there are several areas that need to be addressed to help design teams with neurodiverse traits work effectively and collaboratively. However, given the project timeline and context, it is not feasible to focus on all the above identified implications.

One implication that will not be taken forward in the project is focusing on coaching strategies. Since the project's scope is design teams and how they work, and not directly linked to coaching methods, changing the coaching methods is not in the project's scope.

Instead, the focus will be on addressing the clear communication gap among team members within design teams. Misaligned expectations and a lack of understanding about each other's working style and challenges are significant problems. Moreover, it is essential to establish a safe and inclusive environment where team members can openly share and discuss their unique neurodiverse traits in a fun and engaging manner. Building such a space takes time, but it can be done by incorporating fun and interactive activities as a foundation (Smith, 2018).

04

SCOPING

Building on the insights gained from the previous chapters, this chapter outlines the process of defining the design goal and idea generation. It explains the laddering method used to connect abstract aspirations with practical strategies, leading to the formulation of concrete design concepts.

4.1 DESIGN DIRECTION

Following are the two possible design directions formulated for the project.

To build a shared language to maximize the relatability of neurodiverse traits, aiming to recognize challenges and leveraging strengths in a design team.

This approach aims to support team members in recognizing the challenges they encounter and effectively utilizing their strengths. By gaining an understanding of each other's cognitive styles and work methods, teamwork can be improved. Additionally, the use of a shared language will promote open communication and mutual understanding.

To build a conversation starter for design teams to have a conversation about neurodiverse traits, promoting a safe space.

This approach aims to create a safe space where team members can openly discuss their neurodiverse traits and feel comfortable. The aim is to foster open dialogue, mutual understanding, and respect within the team.

4.2 DESIGN GOAL

At this stage of the project, it became clear that both possible design directions were relevant and should be combined to move the project forward. Combining these design directions to formulate the design goal was the next step.

The overarching project goal as stated earlier is to foster more inclusive collaboration amongst team members. To enhance this goal and incorporate the possible design directions, a series of "why" questions were explored to uncover the motivation and connections. Figure 6 shows the abstraction laddering process.

Figure 6: Abstraction laddering of the design goal

By understanding the "whys," abstract aspirations (like inclusivity) were bridged with practical strategies (such as creating a shared language). The resulting design goal is:

To build a shared language within design teams to facilitate conversations about neurodiverse traits in a safe space.

4.3 IDEA GENERATION

After establishing the design goal, ideas were generated (Appendix D) on specific terms within the goal (such as: shared language, facilitate conversation and safe space). This was done to gain a deeper understanding of these terms and to inform the next step of the process, which is concept ideation.

Based on the above idea generation it was chosen that the design intervention should be:

- able to **facilitate** a **meaningful conversation** which encourages an open discussion and helps team members to exchange their thoughts.
- based on a **shared language**, so that team members have a common vocabulary to communicate and are on the same page. This vocabulary should be easy to recognize and adopt.
- a **safe space** where there is room for growth and understanding. This space should be friendly and promote mutual support, trust, and respect.

4.4 CONCLUSION AND PROJECT IMPLICATION

Based on the insights gained from the brainstorming session, an important decision was made to focus the design intervention on the development of a conversation starter. This approach was chosen because it best addresses the identified needs and provides a practical solution for enhancing communication and understanding within neurodiverse design teams.

The design intervention will be centered around creating a conversation starter. This tool will facilitate meaningful discussion, help develop a shared language, and create a safe space for team members to openly talk about their neurodiverse characteristics. By doing so, the intervention will aim to foster a more inclusive and productive collaboration.

05

IDEATION

This chapter details the ideation process and the development of initial concepts for the toolkit. It describes the rationale behind the chosen concepts, and the feedback received from preliminary testing, leading to iterative improvements.

5.1 CONVERSATION STARTER- CARD GAMES

The first step in the ideation phase was to do brainstorming specifically on conversation starters. The objective was to explore and understand the different types of conversation starters available and identify what would best suit the project's goals and context. Given the project's focus on design teams and the desire to create an intervention that is both fun and engaging, the brainstorming naturally moved towards game-based approaches, such as card games, board games, and group games.

Based on the principles of game design and their ability to facilitate social interaction and engagement, card games were identified as a suitable format for the conversation starter. Card games are effective tools for promoting communication and collaboration within teams. According to Salen and Zimmerman (2004), games create engaging and interactive experiences that encourage social interaction and meaningful conversations. Additionally, Zagal, Rick, and Hsi (2006) highlight the effectiveness of card games in fostering collaboration and cooperative experiences, making them an ideal choice for enhancing teamwork in a fun and playful manner.

BENEFITS OF CARD GAMES

Card games offer several significant advantages that make them an excellent choice for fostering team interaction and communication:

- **Portability:** Card games are highly portable and can be played in various settings, whether in a classroom or informal gathering. This makes it easy for teams to integrate the game in their environment (Salen & Zimmerman, 2004).

- **Easy to use:** Card games have simple rules and can be quickly understood. This ease of use ensures that the focus remains on the conversation and interaction rather than on understanding complex game mechanics (Zagal et al., 2006).

- **Engagement and interaction:** The act of drawing cards, responding to prompts, and discussing with team members keeps participants actively involved, which is essential for maintaining meaningful dialogue (Salen & Zimmerman, 2004).

- **Structured but open ended:** While card games provide a structured framework through prompts and rules, they also allow for open-ended discussions. This balance is essential for facilitating conversations about neurodiverse traits, where participants need both guidance and freedom to express their thoughts and experiences (Zagal et al., 2006).

- **Non-Threatening Format:** The playful nature of card games makes them a non-threatening way to address potentially sensitive topics. Participants may feel more comfortable discussing their strengths and challenges in a game setting, which helps in building trust and openness within the team (McGonigal, 2011).

These benefits highlight why card games are particularly effective for team-building activities. They not only facilitate meaningful interactions but also create a positive and inclusive environment, essential for fostering strong team dynamics.

5.2 CONCEPTS

Based on the above observations, four initial concepts were generated keeping in mind the project goal.

Concept A: Typology Card Set

The Typology Card Set concept was designed to raise awareness about various neurodiverse traits within the design team. Drawing inspiration from the "Design for Happiness" deck (Desmet, P., Pohlmeyer, A., & Yoon, J., 2017) and the "Designers Critical Alphabet" deck (Cohen, 2022), this concept aimes to provide team members with a comprehensive understanding of different traits through different trait cards.

Each card in the deck is designed in a way that it has (see figure 7):

- A heading of the trait
- A relatable image depicting the trait
- A definition of the trait
- An example illustrating the trait

Figure 7: Trait cards for concept A

The intend of the card set is to be open-ended with no rules on how to use the cards. This is done to give the team members the liberty to explore the cards at their own pace and have a discussion according to their own will. The primary goal was to make the team members aware of the neurodiverse traits they have.

Concept B: Strengths and Challenges

The Strengths and Challenges concept focuses on helping team members identify and discuss their strengths and challenges in a structured yet engaging way. This concept has a set of cards like concept A but has been gamified to make the process enjoyable and interactive.

Drawing inspiration from two sides of a coin, the cards have strengths written on one side and challenges written on the other side. The aim was to help team members recognize and discuss both strengths and weaknesses.

The gameplay for Concept B involves laying the cards down with the strengths side up and giving team members 2-5 minutes to pick the strength cards they identified with. Each participant is then supposed to place their selected strength cards on the table and discuss why they chose them. Afterward, the cards are supposed to be flipped to reveal the challenges, and the discussion is repeated for the challenges. This process of discussion is also left a little open-ended but allows team members to engage in meaningful conversations about their strengths and challenges, fostering a deeper understanding within the group.

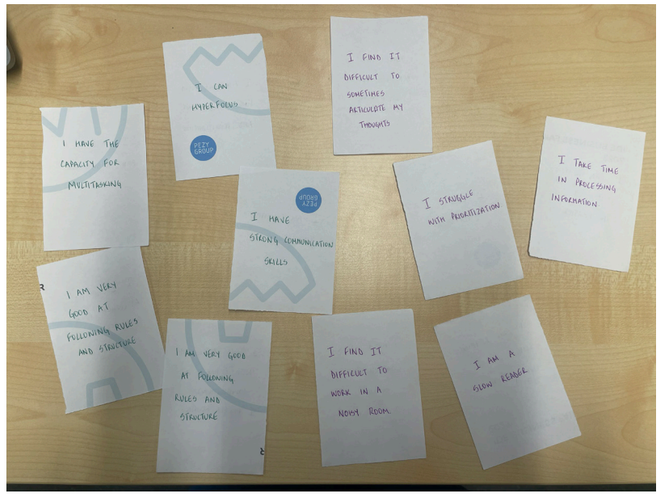


Figure 8: Cards for concept B

Concept C: Prompt Cards with Dice

This concept is designed to facilitate in-depth conversations about neurodiverse traits using a combination of prompt cards and a die. A die is incorporated in this concept to make it more interactive, fun and engaging. All the six faces of the die are different and have been labelled in such a way that it helps the team members to answer the prompt cards in different ways. The six faces are:

- **Recognize Yourself:** Describe a situation where you've experienced this trait in yourself.
- **Support Strategies:** Share how you would help a team member struggling with this trait.
- **Observation:** Name a team member you recognize this trait in and discuss how you would support them.

- **Reflection:** Reflect on a time when this trait positively impacted a team project.

- **Growth:** Discuss how managing this trait has contributed to your personal development.

- **Solutions**: Brainstorm creative ways to leverage this trait for improved team performance.

The gameplay involves each member picking up 5 prompt cards from the deck. On their turn, they must roll the die and then choose a prompt card to answer, using the result of the die to guide their response.

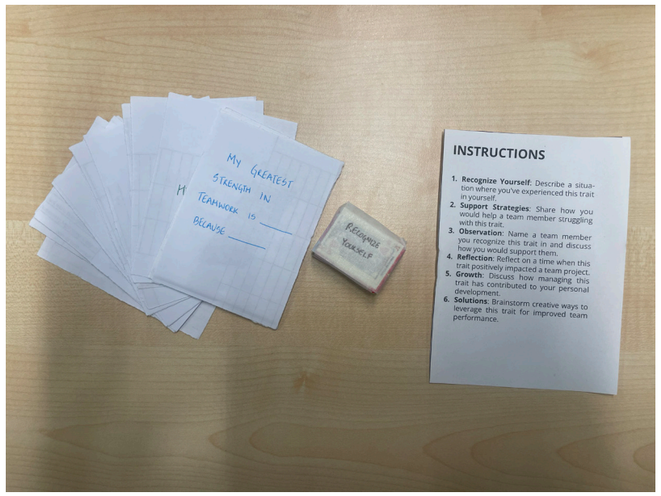


Figure 9: Die and Prompt cards for concept C

Concept D: Meaningful Conversations

This concept aims to facilitate progressive conversations among team members through a structured card game. This concept is divided into three types of card decks to build trust and openness gradually.

Deck 1: Getting to Know Each Other Cards contain general questions designed to build trust and create a comfortable environment.

Deck 2: Talking About Strengths Cards include questions for individual answers or group discussions, aimed at opening up about the strengths team members have and having a discussion based on how they can leverage their strengths to build a stronger team.

Deck 3: Opening Up About Challenges Cards feature questions for individual answers or group discussions, focusing on acknowledging and discussing personal and group challenges. The discussion is aimed at helping team members overcome their challenges and support each other.

The gameplay is simple for this concept. It was a phased approach where cards are supposed to be drawn first from deck 1 and gradually move towards deck and then deck 3. This approach ensures that conversations started with general topics and gradually move towards more personal and potentially sensitive discussions, promoting trust and understanding within the team.

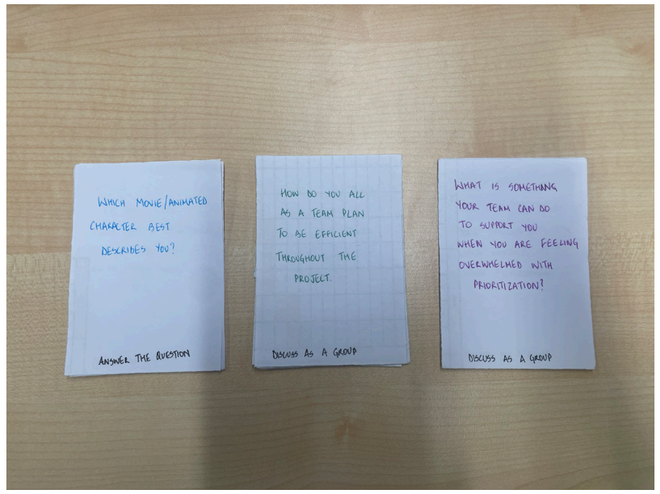


Figure 10: Cards for concept D

5.3 EVALUATION OF CONCEPTS

After developing the concepts, the next step taken was to evaluate the effectiveness and gather feedback from the users and stakeholders about the concepts. Although a formal, structured evaluation process was not conducted, an informal and interactive approach was taken to understand the reactions and preferences of the students and stakeholders.

To evaluate the concepts, students from the faculty were gathered (see figure 11) and each concept was explained to them in detail. The goal was to understand their preferences and gather feedback. The concepts were also presented to the stakeholders to ensure that the concepts aligned with the needs and goals of the design teams.

Figure 11: Participants interacting with the prototype

FINDINGS

- The participants did not know what neurodiverse traits mean.
- All the concepts have something valuable to offer, but none feel complete in terms of achieving the overall project goal of fostering inclusive collaboration and building a shared language within design teams.
- Concept A- Typology Card Set: This concept provides a typology of neurodiverse traits, offering knowledge and a shared language to participants. However, students expressed concerns about the lack of instructions and structure. They were not able to have a conversation using just the cards.
- Concept B- Strengths and Challenges: The idea of presenting strengths and challenges as two sides of a coin is appreciated, but this concept did not translate knowledge about neurodiverse traits to the students. Without a shared language, students felt hesitant to identify and discuss their challenges. But they were quick and excited to recognize their strengths and have a discussion.
- Concept C- Prompt Cards with Dice: Participants found the use of dice confusing and felt that it did not add value to the discussion. The prompts cards were appreciated as they helped in moving the conversation ahead.
- Concept D- Deep Meaningful Conversations: This concept successfully built trust initially but was criticized for feeling too similar to other card games that focused on general team dynamics.
- Participants expressed a desire to engage in a hands-on activity, such as building something together (like with LEGO), to symbolize teamwork and collaboration.
- Participants felt that physically constructing something as a team would be a better idea of working together and leveraging each member's unique strengths.

5.4 INSIGHTS FOR THE FINAL DESIGN

- To sensitize students about the concept of neurodiversity and provide them with some context, there should be a seamless introduction to the concept of neurodiversity.
- The instructions and guidance provided should be clear so that the cards and the toolkit can be used effectively.
- Shared language on neurodiverse traits is one of the most important and main elements of the design, therefore the toolkit should revolve around it.
- The final design should incorporate full knowledge about neurodiverse traits to better communicate and understand team members strengths and challenges.
- Elements which are confusing should be avoided, the focus should be on structured prompts that guide meaningful discussions.
- Incorporating a hands-on activity, such as building something together, can enhance the sense of teamwork and collaboration.

The toolkit should be easy to understand and use to help students learn about neurodiversity effectively. Clear and seamless introduction to the concept of neurodiversity is crucial to sensitizing students. Therefore, the toolkit should begin with a well-defined and engaging introduction that sets the context and importance of understanding neurodiverse traits. Throughout the toolkit, instructions should be straightforward to ensure students can use it without confusion. The final design should include a shared language and detailed information about neurodiverse traits so that students can better communicate and support each other. To keep things clear, the toolkit should have simple prompts that guide meaningful discussions and avoid confusion. Additionally, adding some hands-on collaborative activities while interacting with the toolkit will encourage teamwork and collaboration amongst the team members.

5.5 FINAL DESIGN CONCEPT

Based on the above insights and evaluation of the concepts, the final concept was conceived but was iterated further based on discovery done through testing. As stated above, all the concepts had something good to offer, the final concept was developed by picking up key ingredients from the concepts.

The final concept is a toolkit designed was designed to enhance teamwork and collaboration by celebrating the unique strengths and tackling members of each team member. The toolkit consists of the following things:

- **A comic:** to help the design team understand what neurodiversity means and understand the overall context and purpose of the toolkit.
- **Instruction sheet:** to help guide the team on how to use the toolkit.
- **Prompt cards:** to help facilitate the conversation around the neurodiverse traits each team member identifies in themselves.
- **Trait cards:** a shared vocabulary to communicate the diverse neurodiverse traits and help team members identify their respective traits.

Figure 12: Final design concept elements.

At this stage of the project the interactions (see figure 13) with the toolkit where clear but there was still uncertainty about the number of elements each element would have, and some important questions came up. Before testing the final concept, elements such as trait cards, puzzle pieces and prompt cards were to be worked on further.

How many traits cards would be there?

How will the puzzle pieces look? How will they be joined together?

Where will the comic be placed?

How many prompt cards will be there?

Certain decisions were taken intuitively drawing inspiration from inspiration boards (see appendix F) created and some were left for research while testing.

Trait cards: It was decided that 28 trait cards would be there which corresponds to the total number of traits a neurodiverse individual may possess as stated in section 2.4. All the diverse range of traits should be included in the toolkit to give the participants a comprehensive and diverse range to chose from. The trait cards were defined with the help of ChatGPT.

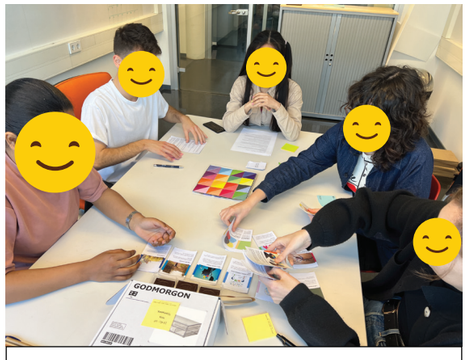
Puzzle pieces: The inspiration of puzzle pieces was taken from tangram pieces. Tangram pieces are simple, versatile and visually appealing. They allow for endless combinations and give the users the freedom to make any figure they desire. 32 triangles of different colors were made, out of which 28 correspond to the traits while the remaining 4 are supposed to be the extra pieces.

At this stage, the comic, the prompt cards and the instruction sheet were not worked on and were left for research while testing with participants. See the image below to see how the concept looked now.

WORKING OF THE TOOLKIT

Team members gather in a project room and start interacting with the toolkit. They open the box and read the comic first to immerse themselves into the topic. **1**

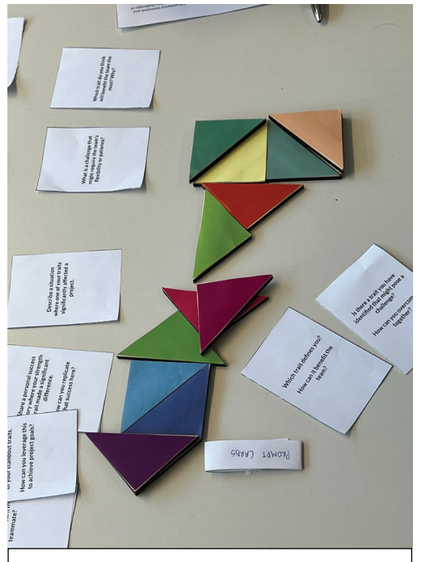
They then read the instructions and understand the next steps. While the instructions are being read, team members take out the elements out of the box. **2**



The team members follow the instruction and laydown the trait cards on the table, so that everyone can read them. **3**

Team members take sometime to read the trait cards and select the puzzle pieces corresponding to the traits they identify in themselves. **4**

After everyone selects the puzzle pieces, team members have a discussion using the prompt cards provided. **5**



As the discussion progresses, team members place the puzzle pieces corresponding to the trait they talk about in the centre, making a puzzle. **6**

Figure 13: Interaction with the toolkit.

5.6 RESEARCH THROUGH DESIGN

To further evaluate and improve the final design a series of iterations were made using the approach Research through Design (RtD). RtD is an approach that connects design practice and research. Unlike traditional research methods that primarily analyze and observe, RtD encourages iterative cycles of creating and reflecting. Here design artifacts such as prototypes, sketches, and models serve as vehicles for insights and understanding (Stappers, P. J., & Giaccardi, E., 2017).

In this project, three iterations to the final design concept were done to reach the final design. In each cycle the prototype was presented to eighter the stakeholders or the design teams. Based on the feedback provided, iterations to the prototype were made.

TESTING SESSIONS

The testing sessions were conducted with master students of Industrial Design Engineering. Participants were recruited via personal connections and diversity was kept in mind while making the teams. The first session involved three design teams (Figure 14) and the second session involved two design teams (Figure 15), each consisting of five team members. The Human Research Ethics Committee of Delft University of Technology approved the research activity and the involvement of the participants. The testing session was carried out in one of the project rooms of IDE.

Process: Below are the steps which were followed for both the testing sessions.

- The testing sessions were 30-45 minutes long which concluded with a short feedback session and two post testing questions.
- Each team member received a small sensitization message via WhatsApp about the topic. They were asked to imagine meeting their team members for the first time before starting the course together. This was done to make sure the participants do not feel out of context.
- Upon gathering in the project room, the team members were presented with the toolkit and were encouraged to interact with it as they wished.
- After the testing sessions, the participants were asked questions about their happy and unhappy moments while interacting with the toolkit. This was done to have clear categorization of the insights and identify what aspects of the toolkit worked well and what areas need improvement.

Testing session 1

Objective: The primary objective of this testing session was to observe how team members interact with the toolkit and to analyze the nature and quality of conversations facilitated by the toolkit. Additionally, it was essential to get feedback on elements such as trait cards, puzzle pieces and prompt cards.

Nationalities: 1 Indian, 2 Spanish, 1 Italian & 1 Dutch

Nationalities: 1 Indian, 1 German, 1 Chinese & 2 Indonesian

Nationalities: 1 Indian, 1 Spanish & 3 Dutch

Figure 14: Participants of testing session 1

FINDINGS

Happy moments:

- **Enjoyment and natural discussion:** The participants enjoyed the discussion and found it fun. They expressed that such a discussion does not happen naturally, but this time it was natural and not forced.

  One participant mentioned, *"I think it's overall interesting because I remember that when I had my first meeting with my group, we didn't talk about that at all. We talked about practical stuff. We haven't talked about, OK, I have difficulties in keeping focus or these kinds of things that were mentioned here. So I think overall it was very interesting because normally."*

- **Comic and colors:** The comic and the colors of the puzzle set a happy mood for the interaction.

- **Discovery of traits:** The participates were surprised to see such a vast number of traits. They saw traits which they did not expect, like 'I forget spelling.' One participant remarked, *"It's not just me but others as well."*

- **Enjoyment in selecting traits:** Participants found it fun to select the traits that belong to them.

- **Traits facilitating discussion:** Participants liked that there was a list to choose from; without a list, the desirable discussion couldn't have been possible.

  One said, *"Because if you would just ask me what's your character, what are your traits? What do you struggle with? I wouldn't have been that. It wouldn't have been that easy to come up with something or I would have forgotten certain things that might pose a challenge and like having them written out."*

- **Images and titles on trait cards:** Participants liked the images and titles of the trait cards, as they were neutral and did not feel negative. One said, *"It's like, you know, read Zodiac or something, yeah."*

Unhappy moments:

- **Confusion with colors:** It was hard for the participants to connect the colors to the trait cards, leading to confusion.

  One participant mentioned, *"You have multiple actually of the same colors, so people can also say like OK, we have a lot of people that are like visual thinkers, for example."*

- **Overwhelming number of trait cards:** There were too many trait cards, which felt overwhelming. One participant said, *"It is going to be a lot of reading!"*

- **Selective reading of trait cards:** Participants did not read all the cards, just the headings, and then selected the trait.

- **Uncertainty with puzzle pieces:** Participants did not know where to build the puzzle or what to do with the pieces.

  Comments included, *"What if we want to pick the same piece?"* and *"Can I get this one, this blue one? I am not sure which it is."*

- **Similar prompt pards:** The prompt cards were similar, leading to repetitive conversations. One participant noted, *"These are quite a lot and some of them are similar."*

- **Identifying own traits:** Participants wanted to put their name on the puzzle pieces to remember their chosen traits.

- **Lack of a clear goal:** The toolkit lacks a clear goal, causing confusion among participants about what they are supposed to achieve.

  One participant noted, *"What if we want to pick the same piece?"* indicating a lack of direction in the activity.

INSIGHTS

- The toolkit successfully facilitated natural and engaging conversations among team members, something that does not happen organically in usual team meetings. This indicates that the toolkit effectively breaks the ice and encourages open dialogue about personal traits and working styles.

- The comic and colorful design elements were well-received and set a positive tone for the interaction. This shows the importance of visual elements in creating an inviting and enjoyable atmosphere, which is crucial for fostering open communication.

- Participants were surprised by the wide range of traits and enjoyed the process of self-identification, similar to reading a Zodiac. This activity promoted self-reflection and awareness, helping team members recognize and appreciate the diversity of skills and challenges within their team.

- The list of traits facilitated meaningful discussions. Additionally, the neutral images and titles on the trait cards ensured a positive perception, preventing negative labeling.

- Participants had trouble connecting colors to trait cards and found the large number of trait cards overwhelming. There is a need for a more intuitive color-coding system and visual hierarchy of traits cards to make the process more engaging.

- The similarity of the prompt cards led to repetitive conversations, and participants wanted to mark the puzzle pieces with their names to remember their chosen traits. This suggests a need for more diverse prompts and a mechanism to personalize the puzzle pieces and track individual contributions.

- The toolkit lacked a clear goal, causing confusion among participants. Defining an objective for the activity is crucial to provide direction and purpose to the interactions, making the experience more cohesive and meaningful.

IMPLICATIONS AND DESIGN CHANGES FOR THE NEXT SESSION

The insights from the first testing session provided valuable feedback and highlighted areas for improvement. For the next round of the testing, several key changes to the toolkit were implemented:

- **Improving color coding of trait cards:** To address the confusion with color coding and the overwhelming number of trait cards, a more intuitive and categorized color-coding system was introduced. All the trait cards were categorized into 7 categories based on their function. Each category was given a different color so that participants can easily relate to the given category of traits.

- **Improving color coding of puzzle pieces:** The same seven colors used for categorizing the trait cards were applied to the puzzle pieces. To enhance clarity and avoid back-and-forth, the puzzle pieces also had the corresponding traits written on them.

- **Enhancing instructions and goal clarity:** The instructions of the toolkit and the gameplay were enhanced to guide the participants. Since, the toolkit lacked a goal, a defined goal was incorporated into the toolkit. The goal was to 'Create your own group logo by DISCOVERING, EMBRACING and COLLABORATING with your team members.' This was incorporated to help participants understand the purpose of building the puzzle together and aimed at enhancing teamwork. To reduce uncertainty about the puzzle pieces, the instruction sheet also included examples of tangram which the team could refer to make their group logo.

- **Reducing the feeling of overwhelm:** To address the issue of overwhelm caused by the 28 trait cards, a change in gameplay was introduced. Instead of laying all the trait cards on the table, the cards were distributed among the players and then passed to the next player.

- **Personalizing Puzzle Pieces**: To address the need for personalization, a mechanism was introduced. The toolkit now consisted of stickers of different colors which could be selected before starting the gameplay. This change was aimed at helping participants remember their selected traits and track individual contributions.

Although the similarity of the prompt cards was acknowledged, it was decided to prioritize other tasks over making changes to them because of time constraints. The current prompts had already been successful in facilitating meaningful conversations, so they were considered sufficient for the current phase of the project. Introduction of more diverse and varied prompts may be considered in future iterations to further enhance discussions.

By implementing these changes, the toolkit was refined further for the next testing session.

Testing session 2

Objective: The objective of the second testing session was to evaluate the effectiveness of the changes made to the toolkit based on feedback from the first session. This included assessing the new color-coding system, the enhanced instructions and goal clarity, the modified gameplay to reduce the feeling of overwhelm, and the personalization of puzzle pieces. The session aimed to determine whether these adjustments improved the interactions and fostered a more meaningful and collaborative discussion among team members.

Nationalities: 2 Indian, 1 Indonesian, 1 Chinese & 1 Dutch

Nationalities: 2 Indian & 2 Dutch

Figure 15: Participants of testing session 2

FINDINGS

Happy moments:

- **Comic's positive impact:** The comic effectively set a fun and positive mood, immersing team members in the context.
- **Goal excitement:** Having a clear goal to create their group logo excited the participants, giving them a sense of collective identity.
- **Clear Instructions:** The instructions were straightforward and easily followed.
- **Enjoyable trait identification:** Participants enjoyed identifying their traits

using the trait cards, which had all the necessary information and were easy to read.

- **Effective personalization:** Personalizing the puzzle pieces helped participants easily identify their contributions.

- **Color-coding success:** The color-coding system was well-received, making it easy for participants to find the right puzzle pieces.

- **Smooth conversations:** Participants were able to have smooth and efficient conversations about their traits, feeling heard and understood. Team members discussed how they could accommodate each other's traits in their teamwork to improve collaboration.

- **Enjoyable logo creation:** Making the group logo using tangram examples was particularly enjoyed. Each team member had a different approach, leading to discussions about various opportunities. Creating the logo helped break the seriousness of the conversation and set a fun mood again.

Unhappy moments:

- **Comic's graphical smoothness:** The comic was not graphically smooth, making it a bit difficult to read at times.

- **Overwhelming text on instruction sheet:** Participants found it tiring to read a lot at once, and the instruction sheet had too much text with a small font size.

- **Pressure on slow readers**: Passing the trait cards around added pressure to slower readers.

- **Similar prompt cards:** Some prompt cards were too similar, causing redundancy.

- **Confusing prompts:** Some prompts were not directly related to the traits, leading to confusion among participants.

INSIGHTS

- The comic successfully sets a positive and engaging tone, but its graphical smoothness and readability need improvement, it lacks visual hierarchy right now.

- Having a clear goal proved to be essential and highly motivating for participants, providing them with a sense of direction and purpose.

- While instructions were clear, reducing the amount of text and increasing font size would improve readability and the experience.

- The process of identifying traits, though enjoyable, needs to be more efficient to reduce time consumption and pressure on participants.

- While the prompts facilitated meaningful conversations, increasing their diversity and ensuring direct relevance to traits will enhance clarity and engagement.

- The toolkit is effective in facilitating meaningful conversations using the trait cards, meeting the project's goal. Although interacting with the toolkit is time-consuming, it is subjective and depends on how much time the team members want to invest.

5.7 IMPLICATIONS LEADING TO THE FINAL DESIGN

Based on the insights of the second testing session, the following implications were identified and addressed:

- **Enhancing comic readability:** While the comic successfully set a positive and engaging tone, its graphical smoothness and readability need improvement. The final design will include a more polished and visually appealing comic with clearer text to ensure it is easily readable. The comic will be organized in a uniform manner to ensure an easy flow.

- **Streamlining instructions:** The instructions, although clear, contained too much text and were difficult to read due to the small font size. In the final design, the instructions will be concise, with larger fonts to enhance readability and understanding. The instruction sheet will be designed like a brochure, dividing information across multiple pages for better clarity.

- **Improving prompt cards:** While the prompt cards facilitated meaningful conversations, there were issues with similarity and relevance as identified in both the testing sessions. Although changes to the prompt cards will not be prioritized immediately due to time constraints, more diverse and varied prompts may be considered in future iterations to further enhance discussions.

- **Color-coding and personalization:** The improved color coding of trait cards and puzzle pieces will be maintained.

- **Maintaining a clear goal:** The clear goal of creating a group logo was well-received and provided motivation and direction. The final design will retain this goal and further emphasize its importance in fostering teamwork and collaboration.

5.8 CONCLUSION

Although there are many areas that need improvement for the toolkit to work effectively, the project timeline required to focus on the most critical elements. This led to prioritizing enhancing the instruction sheet, comic, and overall graphics. These changes were made to ensure that the toolkit is functional and effective, while still meeting the project's deadlines. It was understood that the toolkit may need further revisions in the future, but for now, the testing phase was concluded, and the design was finalized. This approach ensured that the toolkit remains impactful, aligning with the project's objective of encouraging meaningful conversations and promoting collaboration within neurodiverse design teams.

06

FINAL DESIGN

The final design chapter presents the refined toolkit, incorporating the feedback and insights from the evaluation phase. It describes the final elements of the toolkit, including the improved instructions, comic, and graphics.

Figure 16: Final toolkit design

6.1 DESIGN CONCEPT

OVERVIEW

The final design concept of the toolkit revolves around creating a structured yet flexible framework that enables design teams to recognize, discuss, and leverage neurodiverse traits. The toolkit (figure 16)-**"KICKSTART YOUR TEAMWORK"** consists of trait cards, prompt cards, puzzle pieces, a comic, sticker sheey and an instruction sheet, each serving a specific purpose in facilitating meaningful conversations and fostering a collaborative environment.

GOALS AND OBJECTIVES

The primary goal of the design is to foster a more inclusive environemnt and enhance collaboration within design teams by embracing neurodiversity. This toolkit is designed to help design teams understand and leverage each other's unique strengths and challenges.

The objectives include:

- Facilitating open discussions about neurodiverse traits.
- Helping team members recognize and appreciate each other's strengths and challenges.
- Providing a shared language to improve communication.
- Creating a supportive environment where team members feel comfortable expressing their unique cognitive styles.

WHAT IS INSIDE THE TOOLKIT?

Figure 17: Elements inside the toolkit

The design toolkit is composed of several key elements:

- **Trait Cards:** These cards list various neurodiverse traits, helping team members identify and discuss their own and each other's traits.
- **Prompt Cards**: These cards provide structured questions to facilitate in-depth conversations about neurodiverse traits.
- **Puzzle Pieces:** Representing individual traits, these pieces are used to create a group logo, symbolizing the collective strengths of the team.
- **Comic:** A comic strip that introduces the concept of neurodiversity in a relatable and engaging manner.
- **Instruction Sheet:** A guide that provides clear instructions on how to use the toolkit effectively.
- **Sticker Sheet:** Stickers for customization, allowing team members to personalize their puzzle pieces and reinforce a sense identity.

6.2 ELEMENTS OF THE TOOLKIT

Each element of the toolkit play a vital role in facilitating open dialogue and mutual understanding among team members. This section will explore how each component contributes to fostering a supportive and collaborative team environment.

Figure 18: Comic

Comic

The first thing that a person will see after opening the box is the comic (figure 18).

- **Role:** The comic serves as an engaging introduction to the concept of neurodiversity. It sets the context and helps team members understand the importance of recognizing and valuing diverse cognitive styles.
- **Content:** The storyline follows 2 characters who learn about neurodiversity and its benefits, providing a relatable narrative that resonates with the teamwork. See appendix... for the entire comic.

Instruction Sheet

After reading the comic and opening the box, the instruction sheet (figure 19) is read. The instruction sheet is a one-fold brochure which gives:

- **An overview:** The instruction sheet provides step-by-step guidance on how to use the toolkit. It ensures that all team members understand the purpose and process of each activity.

- **Guidance:** Clear and concise instructions help facilitate smooth interactions and maximize the effectiveness of the toolkit.

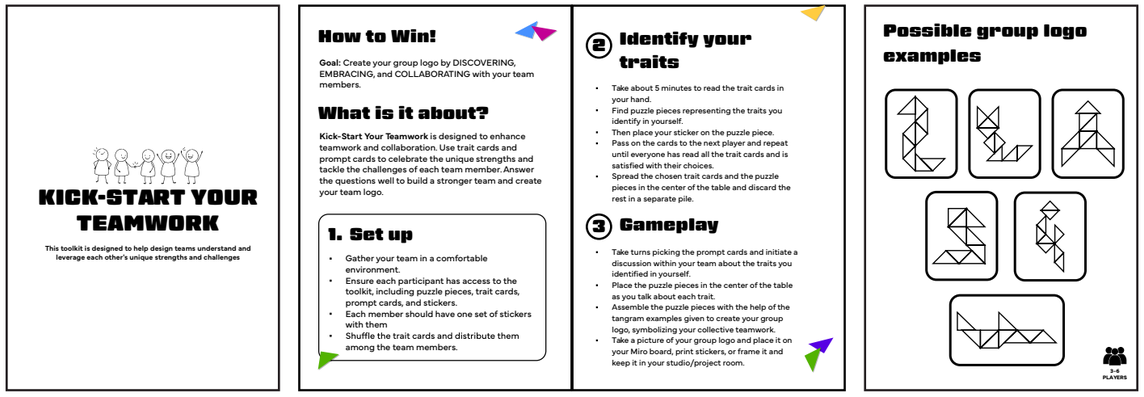


Figure 19: Instruction sheet

Sticker Sheet

- **Purpose:** The sticker sheet allows for customization of puzzle pieces, enabling team members to personalize their pieces and reinforce a sense of ownership and identity.

- **Content:** Stickers in various colors and designs that can be used to decorate puzzle pieces.

- **Usage:** Team members use stickers to personalize their puzzle pieces, making it easier to identify and remember their selected traits and contributions.

Prompt Cards

Prompt cards (figure 20) are used to guide conversations about neurodiverse traits, ensuring that discussions are structured and productive.

- **Types of Prompts:** The prompts include questions about personal experiences, support strategies, and reflections on how traits influence team dynamics.

- **Function:** These cards help team members delve deeper into understanding each other's traits and developing strategies for effective collaboration.

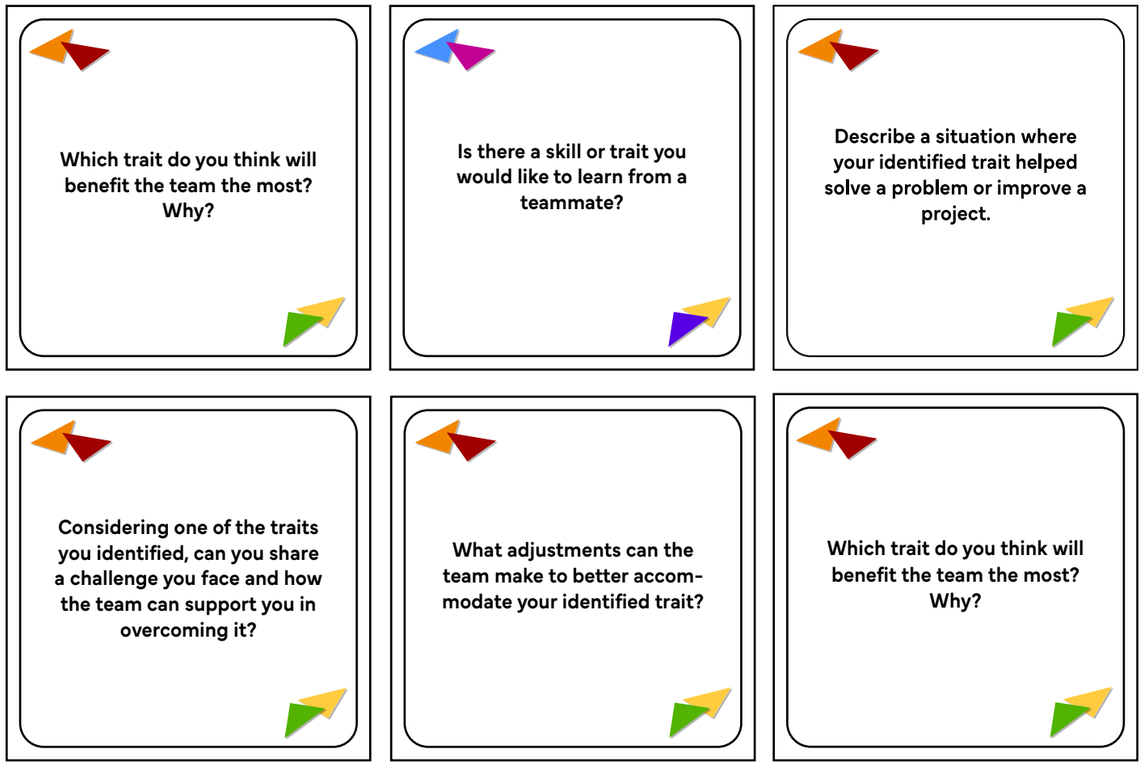


Figure 20: Examples of prompt cards

Puzzle Pieces

The puzzle pieces have been designed taking inspiration from tangram puzzle to encourage team members to create their own logo.

- **Significance:** The puzzle pieces symbolize the unique contributions of each team member. By assembling the pieces into a group logo, the team creates a visual representation of their collective strengths and challenges. Prompt cards are used to drive the conversation which helps team members put the puzzle pieces together, making a logo

- **Contribution:** Each piece corresponds to a specific trait, and team members select pieces that represent their traits, contributing to the creation of the logo.

Figure 21: Puzzle pieces

Trait Cards

There are 28 trait cards corresponding to the 28 neurodiverse traits. The cards have been categorised into seven categories, giving them a unique colour for easy identification.

- **Purpose:** Trait cards are designed to help team members identify and discuss neurodiverse traits. They provide a starting point for conversations about individual strengths and challenges.

- **Content:** Each card contains a heading (the trait), a relatable stock image, a definition of the trait, and an example illustrating how the trait might manifest.

- **Usage:** Team members select trait cards that they identify with and share these with the group, facilitating a discussion about how these traits impact their work and interactions.

Figure 22: Puzzle pieces

Below is a detailed overview of the 28 trait cards created:

I AM A LOGICAL THINKER

Logical thinking involves systematically analyzing problems or situations, identifying patterns and relationships, and applying reasoning to arrive at logical conclusions.

It's like navigating a complex maze, where each decision is guided by a rational approach.

I AM A HOLISTIC THINKER

It involves seeing the interconnectedness of various parts and understanding the broader context or implications of a situation or concept.

It's like looking at a forest and understanding how each tree contributes to the entire ecosystem, rather than focusing on individual trees.

I FIND IT DIFFICULT TO THINK RATIONALY

Has trouble maintaining objectivity and making rational decisions due to emotional involvement.

Imagine being in a situation where a decision needs to be made calmly and logically, but it feels like being trapped in a pool of emotions.

I STRUGGLE TO ORGANIZE THOUGHTS ON PAPER

Finds it difficult to structure thoughts and ideas coherently in written form.

It's like trying to build a house of cards on a windy day, where each card represents a part of your ideas that keeps getting blown away.

I ENGAGE IN SPECIFIC INTERESTS

Engages in repetitive actions or has a narrow range of interests, often to the exclusion of other activities.

It is like tracing the same pattern on a piece of paper over and over again, finding comfort in the familiarity of each stroke.

I PREFER A ROUTINE

Strong inclination towards established patterns and familiar surroundings, making it challenging to adapt to changes in schedule or environment.

It's like trying to navigate through a new city without a map, where every unfamiliar turn feels disorienting and unsettling.

I STRUGGLE WITH SOCIAL INTERACTIONS AND CUES

Finds it challenging to engage in social interactions and comprehend social norms and cues.

It's like trying to read a book with missing pages, making it hard to grasp the full story of what others are communicating.

I FIND NON-VERBAL COMMUNICATION HARD

Struggles with interpreting and responding to social cues and non-verbal signals.

It's like trying to read a book in complete darkness, where everyone else has a flashlight but you.

I HYPERFOCUS

Hyperfocus is like zooming in on a single task, blocking out any distractions or interruptions.

It's like diving into a deep pool of concentration, where you become fully immersed in your work, unaware of anything else happening around you.

I EXCEL IN REASONING AND PROBLEM SOLVING

The ability to critically analyze problems, identify root causes, and develop effective strategies or solutions to address them.

It's like being the Swiss Army knife in a toolbox, equipped with versatile skills to tackle any problem efficiently and creatively.

I SEEK ALTERNATIVE APPROACHES

The ability to generate innovative ideas or solutions by approaching problems from unconventional perspectives.

It's like being a chef who experiments with unexpected ingredients to create a unique and delicious dish.

I AM OPEN TO TAKING RISKS

The willingness to take risks and explore new ideas or approaches, often leading to bold and creative solutions.

It's like diving into uncharted waters, driven by the thrill of discovery and the chance to uncover innovative solutions.

I AM ALWAYS ENTHUSIASTIC

Enthusiasm is like a sudden rush of energy that moves you forward, even when you're feeling tired or drained.

It's like finding a burst of energy just as you see the finish line in a marathon, pushing you to keep going.

I FORGET SPELLINGS

Experiences difficulties in recalling spelling and vocabulary, affecting written communication.

It's like trying to recall the name of an actor from your favorite movie, but no matter how hard you try, it feels like it's on the tip of your tongue.

I HAVE STRONG COMMUNICATION SKILLS

Effectively expressing ideas, thoughts, and information verbally, facilitating clear and meaningful communication within a team or group.

It's like being the clear signal in a group call, ensuring everyone hears and understands the message without any distortion.

I HAVE GOOD RETENTION RATE

Retention is like having a sponge-like memory, soaking up vast amounts of information with deep focus and interest.

It's like building a library of knowledge in your mind, where details are stored and easily accessed.

I STRUGGLE WITH TIME MANAGEMENT

Difficulty in organizing tasks and managing time effectively, often leading to missed deadlines or incomplete tasks.

It is like having a desk cluttered with papers, each representing a task or responsibility demanding attention.

I STRUGGLE STAYING ON TOPIC

Finds it challenging to remain focused on a single task or topic, resulting in unfinished projects and disorganization.

It is like navigating through a maze where every turn leads to a new distraction or task, making it difficult to reach the exit.

I AM A MULTITASKER

Multitasking is having the ability to manage several tasks at once.

Like a skilled juggler tossing multiple balls in the air and catching them without dropping any.

I HAVE STRONG VISUAL SPATIAL AWARENESS

The ability to perceive and interpret spatial relationships and patterns within visual information or data.

It's like having a built-in GPS system in your mind, effortlessly navigating through complex environments and recognizing familiar landmarks.

I FIND FINE MOTOR SKILLS CHALLENGING

Struggles with tasks requiring precise hand movements, such as writing or drawing.

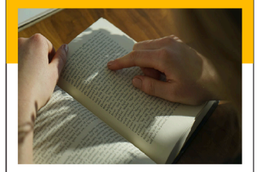
It is like trying to thread a needle with trembling hands, where each attempt feels like tiptoeing on a tightrope between success and frustration

I PAY ATTENTION TO DETAIL

Carefully observing and scrutinizing information or tasks to ensure accuracy, completeness, and quality in the final outcome.

It's like a jeweler inspecting a gemstone, ensuring every facet is perfect and free of flaws.

I AM A SLOW READER



Difficulty processing written information at a typical pace, resulting in a slower reading speed compared to peers.

It's like trying to walk through thick mud, where every step requires extra effort and progress is slow and laborious.

I TAKE TIME TO ARTICULATE MY THOUGHTS

Experiences challenges in clearly expressing thoughts and ideas verbally.

It is like trying to express yourself in a foreign language without knowing the words or grammar rules.

I AM VERY EFFICIENT

Efficiency means doing things well and quickly by following the right steps in the right order.

It's like taking a direct route to your destination, making the most of your time and resources along the way.

I AM SENSITIVE TO LIGHT

Finds bright lights uncomfortable or overwhelming, leading to discomfort or distraction.

It is like walking through a sunlit field without sunglasses on a bright summer day, where the glare of the sun feels like needles piercing your eyes.

I AM SENSITIVE TO SOUND

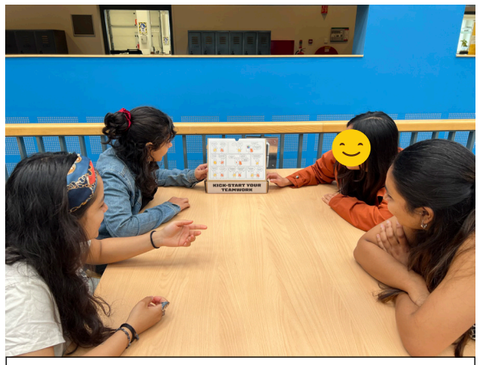
Easily disturbed or distracted by noises that others might find insignificant.

It's like being at a concert with the volume cranked up to maximum, where every note and beat feels like it's rattling your brain.

6.3 INTERACTION WITH THE TOOLKIT

Through a storyboard, this section explains how the toolkit will be interacted with within a design team.

Once the team members gather together for the first time to start a course, they get "Kick-Start Your Teamwork" toolkit to interact with. **1**



The team members start by reading the comic strip. Two members read it aloud for the other two remaining members **2**

The toolkit is opened fully after reading the comic and the team members start taking out the elements out of the box. **3**

While one team member is reading the instructions aloud, the other members are setting up the elements as stated in the instruction sheet. **4**

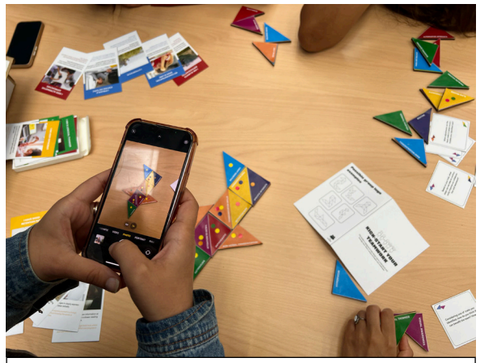
The team members distribute the trait cards within themselves and take a moment to read them. The trait cards are passed around until everyone is done reading all the cards. **5**

As the cards are being read, team members start putting their stickers on the puzzle pieces for easy identification. **6**

Once everyone has identified the traits they recognize in themselves, the prompt cards are picked on by one. **7**

Using the prompt cards, the team members engage in a meaningful conversation about their neurodiverse traits. **8**

As the team members talk about their traits, they join the puzzle pieces resonating their traits together to make a group logo. The team members use the tangram examples to make the logo. **9**



After the team is satisfied with the logo creation, one of them takes a pictures of the logo to upload it on their miro board. **10**

6.4 OVERVIEW OF THE TOOLKIT

07

DISCUSSION

The discussion chapter reflects on the overall project, including the limitations and implications of the research. It offers future recommendations for further development of the toolkit and discusses the potential impact of the project on fostering inclusive and effective design teams.

7.1 CONCLUSION

The goal of this project was to bridge the gap in design teams by encouraging them to embrace neurodiversity, ultimately enhancing their inclusiveness for better collaboration. Through literature review, interviews with coaches, course coordinators, and academic counselors, and iterative testing of a toolkit, this project has developed an intervention aimed at fostering open dialogue and mutual understanding of neurodiverse traits within design teams using a shared language.

The findings from the literature review highlighted the benefits and challenges of diversity in design teams, emphasizing the importance of creating a safe and open environment for better collaboration. The interviews validated the literature review and provided practical insights into the dynamics of neurodiverse teams, revealing common challenges and strategies for improving team dynamics. The iterative testing of the toolkit demonstrated its effectiveness in facilitating meaningful conversations and enhancing team collaboration.

The project has developed a toolkit that successfully promotes awareness and understanding of neurodiverse traits, creating a more inclusive and supportive environment for design teams. This toolkit not only facilitates discussions about neurodiverse traits but also helps team members recognize and leverage each other's strengths, ultimately leading to improved team performance. The toolkit successfully provided a platform for team members to identify, acknowledge, and discuss their unique strengths and challenges.

7.2 FUTURE RECOMMENDATIONS

Although the toolkit is affective in fostering better collaboration and teamwork, ceratin factors for future should be taken into account.

Phased Implementation of the Toolkit

Currently, the toolkit is designed for the initial phase of any project where the team is formed, and students get to know about neurodiverse traits and engage in a discussion. Given that courses at IDE run throughout one quarter or two, it is essential to consider how the toolkit can be used throughout the course. In future iterations, the toolkit could be divided into three phases:

- **Phase 1:** Discover and Acknowledge- This phase begins at the start of the project, helping team members identify and discuss their neurodiverse traits.

- **Phase 2:** Embrace and Grow- Occurring at the middle of the project, this phase would focus on leveraging the identified traits for personal and team growth.

- **Phase 3:** Keep Growing- Taking place at the end of the project, this phase would aim to consolidate learning and ensure that the participants take the learning along with them.

The three phases could be differentiated from each other using different prompt cards for each phase. Each phase could have prompt cards catering to the specific phase and guide the conversation accordingly.

Time Allocation for Toolkit Interaction

In future iterations, it is important to establish guidelines for how much time should be allocated for interacting with the toolkit. The current design allows for flexible conversations, which could last for hours. Defining specific time frames for each phase of the toolkit would help manage the duration of interactions and ensure that they fit within the course schedule.

7.3 REFLECTION

On a personal level, working on this project has deepened my understanding of the neurodiverse traits an individual may possess and how these traits impact teamwork. We may not realize it, but it is crucial to consider how people work, think, and collaborate. Addressing these aspects is not just about fostering inclusivity; it is about unlocking the full potential of each team member to work effectively.

One key insight from this project is the necessity of customization. While developing the toolkit, it became evident that a one-size-fits-all solution would not suffice for every course or team. Each course at the Industrial Design Engineering faculty has distinct objectives, and the toolkit needs to be adaptable to these specific needs. Tailoring the prompts to align with course requirements, for instance, ensures that the toolkit remains relevant and engaging, even when used across different courses. This adaptability is crucial for maintaining the toolkit's effectiveness and appeal.

Another important realization is the role of the toolkit as an initial conversation starter. The toolkit is designed to facilitate the first steps in understanding and discussing neurodiverse traits within a team. Observing participants interact with the toolkit for the first time highlighted its potential to spark meaningful conversations about individual traits and working styles. However, once students have had this initial experience, they may not need to start from scratch in subsequent courses. Instead, they can build upon their previous interactions, using the toolkit's components selectively based on their evolving needs.

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APPENDIX

Appendix overview is provided below.

Note: Appendices are located in a separate PDF document.

A	INTERVIEW ANALYSIS
B	INTERVIEW SCRIPT
C	INTERVIEW TRANSCRIPTION
D	IDEA GENERATION
E	CONCEPT EVALUATION
F	INSPIRATION BOARDS
G	GAMEPLAY FLOWCHART
H	TESTING SESSION ANALYSIS
I	TOOLKIT TEMPLATE
J	PROJECT BRIEF
K	HREC APPROVAL
L	INFORMED CONSENT FORM