Neurodivergent Employees: AI's Role in New Work Challenges

Exploring Neurodiverse Team Dynamics in the Era of New Work: Leveraging AI for Inclusive Environments

Mareike Victoria Keil

University of Mannheim, Chair of Artificial Intelligence, mareike.victoria.keil@students.uni-mannheim.de

Dominic Ketzer

:em engineering methods AG, dominic.ketzer@em.ag

Disruptive change has driven the digitalization and transformation of work structures in the wake of the Covid-19 pandemic, with new types of work models increasingly finding their way into familiar work structures with lasting impact. This has triggered a rapid development as part of the New Work megatrend, which, alongside challenges such as teleworking, has created great opportunities such as better integration of individuals and certain groups of people, e.g. people with disabilities, into the primary labor market. Neurodiverse teams face particular challenges due to the changing workplace, especially in terms of communication, self-organization and working practices. This paper addresses these challenges and proposes solutions based on artificial intelligence (AI) to ensure the competitiveness of companies in the implementation of New Work methods and models and to counteract the shortage of skilled workers.

Additional Keywords and Phrases: Neurodivergence, New Work, Artificial Intelligence, Inclusion, Psychological Empowerment

1 MOTIVATION

The New Work megatrend has fundamentally changed work structures [Gatterer, 2022], especially during the Covid-19 pandemic [Helmold, 2021; Klinksiek, 2023]. Novel working models such as flextime have been developed or accepted as a matter of course, and remote working has become standard in many industries [Downes, 2011; Popovici, 2020; Tomczak, 2022]. This offers many new opportunities and also promotes the inclusion of people with disabilities, single parents or people with different neurocognitive abilities [Tomczak, 2022] and therefore different needs, as travel is reduced, flexible working hours ensure a better integration of personal obligations into the working day and sensory overload is reduced by avoiding large gatherings of people in the office [Eldridge, 2011; Haar, 2007; Szulc, 2023]. On the other hand, these changing conditions pose new challenges for both employees and employers. These include the sometimes inadequate digitization and poor infrastructure, as well as people's lack of self-discipline to avoid being distracted and motivated to work in environments outside the office [Popovici, 2020; Klinksiek, 2023]. This is why many companies such as SAP, Amazon and Tesla are calling their employees back to the office [HRK News Bureau, 2024]. However, this inevitably raises the question of whether this is the right step to take in the era of New Work, where there is also a shortage of experts [Katanich, 2024], and whether a distinction needs to be made between different groups of people in order to achieve optimal work performance for teams and individuals [Tomczak, 2022; Wyrsch, 2020]. Especially since more and more companies such as SAP are hiring people with autism, for example, because they have recognized the strengths of neurodivergent employees [Austin, 2017; Brinzea, 2019], a more differentiated view must be taken, and a decision made based on this in order not to exclude certain groups of people from the primary labor market again. This risk exists, among other things, because neurodivergents, compared to neurotypicals, dislike being among people and are more likely to suffer a meltdown due to sensory overload, which in turn has a massive impact on work performance (see figure 1).

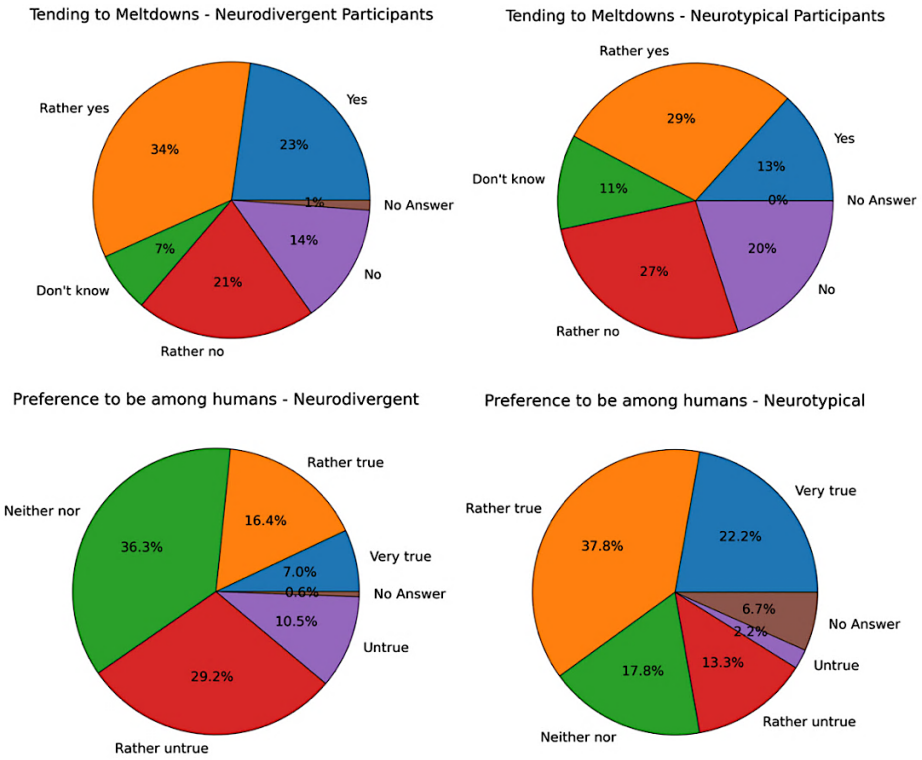

Figure 1: Percentage distribution of the tendency to meltdowns and the preference to be among people differentiated between neurodivergent (left) and neurotypical (right) individuals. Results are taken from Keil's [2024b] study on AI-supported UI design for neurodivergent users.

The concepts of New Work are particularly suited to the inclusion of neurodivergent people and the promotion of neurodiversity in teams, as it values diversity. It is also based on strengths-orientated approaches, flexibility and adaptability, inclusion and support, creativity and innovation, and empathy and collaboration. The aim is to empower and support individuals according to their needs in their way of working and their workplace structure, which is mainly characterized by the company and its office structure as well as home offices. Overall, neurodiversity/neurodivergence and New Work can go hand in hand to promote an inclusive, flexible, and innovative work culture that values the diversity of employees and promotes their individual strengths and talents. This human-centered approach, and the associated leveraging of the skills of individuals within these diverse teams, leads to better and smarter products due to the diversity of perspectives and the resulting tension within the system (i.e. teams or networks), thus enabling complex problem-solving strategies and solutions [Kruse, 2004; Stuber 2014].

The paper therefore examines neurodiverse teams with a focus on neurodivergent employees, e.g. with autism or ADHD, and how emerging New Work challenges can be addressed with the trend towards artificial intelligence (AI) to ensure the competitiveness of companies, especially with regard to the shortage of skilled workers. It also discusses psychological empowerment (PE) as a New Work model [Schermuly, 2021] and analyzes the methods of the New Work Barometer [Schermuly, 2021]. The authors use data from Keil's [2024b] study of AI-supported user interface (UI) design for neurodivergent users.

2 FOUNDATIONS

2.1 Data Basis - Survey and Workshop Information

One part of the data was collected in informal interviews during four individual workshops in which the participants (see table 1) were asked what bothers them at their workplace [Keil, 2024a]. The second part of the data was collected in the survey conducted by Keil [2024b] within the study on AI-supported UI design for neurodivergent users, which had 133 questions and included 222 participants (see figure 2).

Table 1: Interviewees Background Information.

Participant	Kind of Neurodivergence	Employment Relationship	Medically Diagnosed / Approved
1	ADHD	Full Time	Medically Diagnosed
2	Autism	Full Time	Medically Diagnosed
3	Highly Gifted	Full Time	Approved
4	ADHD/Highly Gifted	Part Time and Student	Medically Diagnosed and Approved

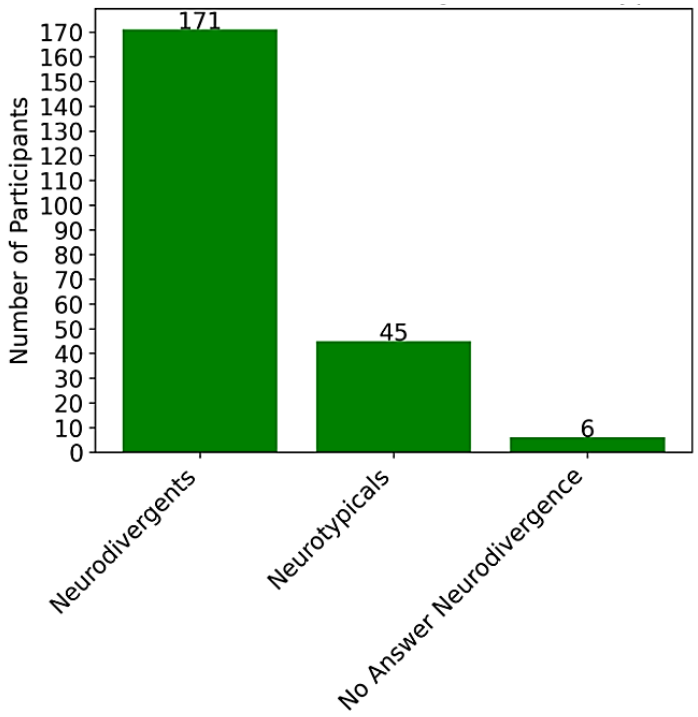

Figure 2: Distribution of neurodivergent and neurotypical participants. 171 have been neurodivergent, 45 neurotypical and 6 did not answer. Results are taken from Keil's [2024b] study on AI-supported UI design for neurodivergent users.

The data from this study is particularly suitable as a basis for argumentation for this paper, as the participants are relatively evenly distributed in terms of both gender and age (see figure 3) and more than 50% are in part-time or full-time employment (see figure 4).

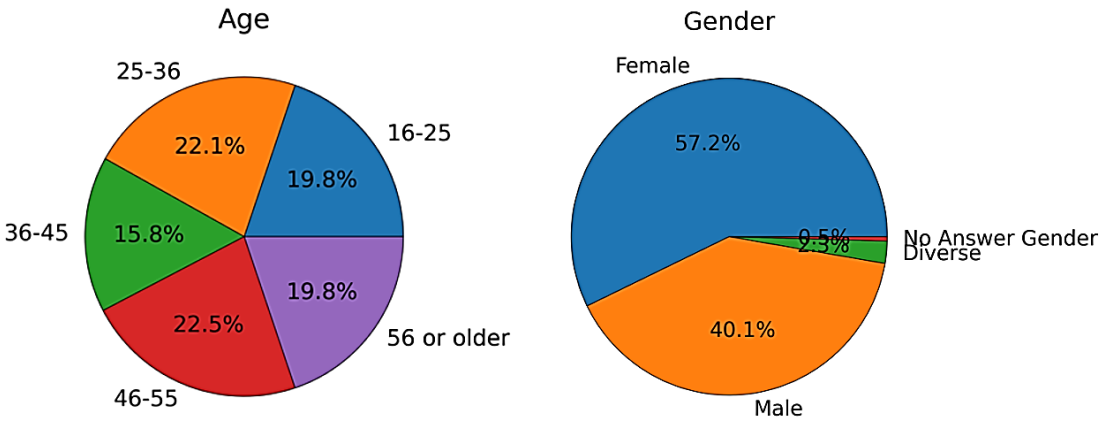

Figure 3: Percentage distribution of survey participants regarding age (left) and gender (right). Results are taken from Keil's [2024b] study on AI-supported UI design for neurodivergent users.

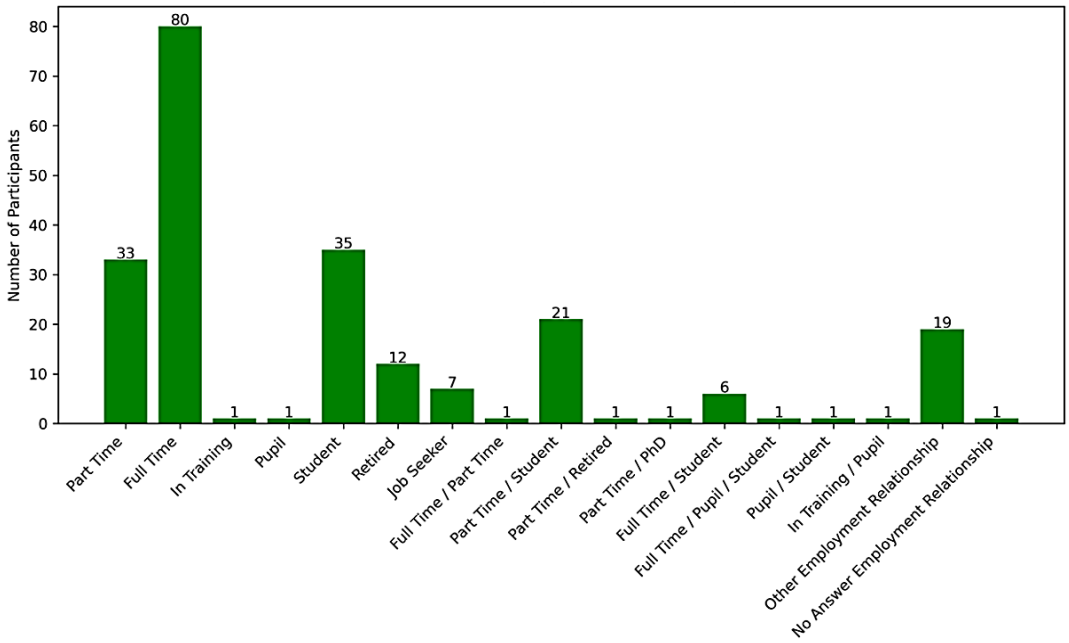

Figure 4: Distribution of employment relationship among the survey participants. Results are taken from Keil's [2024b] study on AI-supported UI design for neurodivergent users.

2.2 Neurodivergence

Given the natural variations in brain development, the concept of neurodiversity, distinct from neurodivergence, emphasizes embracing neurological differences among individuals. Conditions such as autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), or learning disabilities are recognized as part of this spectrum rather than disabilities [Orsini, 2012]. The term "neurodiversity" emerged in the late 1990s within the neurodiversity movement, characterized by activist Judy Singer, to advocate for equality and inclusion of neurological minorities [Houdek, 2022].

The introduction of terms like "neurodivergent" and "neurotypical" helps distinguish between individuals with typical and atypical neurological characteristics. Neurodivergent individuals encompass those with ASD, ADHD, Dyscalculia, Dyslexia, specific autistic traits, or unconventional cognitive styles, including giftedness [Brinzea, 2019; Bruyère, 2022]. Consequently, neurodivergent individuals often exhibit highly intricate thought patterns and behaviors, fostering a desire for detailed understanding [Bruyère, 2022; Doyle, 2022; Houdek, 2022].

It's essential to recognize that within the neurodivergent community, there exist diverse cognitive manifestations, each associated with unique strengths and weaknesses [Bewley, 2016]. For instance, ADHD is linked to creativity, while dyslexia is correlated with specific visual-spatial talents [Houdek, 2022].

2.3 New Work

New Work as a term has existed since the 1980s, originating in Detroit under Frithjof Bergmann [Bergmann, 2020]. Initially regarded as a utopia, the term did not undergo any changes for a long time. In the meantime, it has developed in various directions, in the form of principles of action, packages of measures or even company names. As a result, the term is interpreted in different ways. This leads to different implementations worldwide. On the one hand, there are holistic approaches which, based on the original, rather utopian, understanding of New Work, aim to introduce new working models in companies and create new working structures with diversified measures. On the other hand, there are individual measures such as working from home, which are directly associated with the high expectations of New Work. As early as 1980, Bergmann's utopia focused on each individual acting and living in a way that meets their needs [Bergmann, 2020]. More far-reaching ideas imply the creation of a New Work culture that increases the sovereignty of everyone. The basic idea of New Work was to counter the grievances of the time, which still exist today or whose effects can still be felt, and to achieve the end of exhaustion, the end of alienation, and the end of burnout [Berend, 2020]. Due to the emerging automation of work at that time, it was necessary to discuss corresponding approaches. In summary, the core essence of the New Work idea was an alternative model to wage labor in the capitalist economic system. The following two social challenges that needed to be overcome were identified [Berend, 2020]:

- elimination of unsatisfactory, draining and ultimately unhealthy work,
- dealing with the automation of jobs

Today, in addition to automation, digitalization, including its challenges and opportunities, is also being considered. The high degree of organization, through which most work is performed in organizations, contradicts the original meaning of New Work and its paradigm of sovereignty, self-concordance, and well-being. Since the beginning of the 2000s, project-based, temporary, and networked working environments have become increasingly important compared to the industrial, stationary line world to maximize profits. This applies to companies that develop products and services [Böhle, 2018].

Therefore, one approach of recent concepts is to approach the term New Work through today's understanding of work and to justify the inadequate work-life balance of many employees due to the high complexity and thus high time demands of the world of work. New Work represents a solution, as the New Work structures offer the opportunity for self-direction, for creating meaning and for shaping one's own work [Hackl, 2017]. In addition to the commercialization of the term from

the corporate side [Schermuly, 2021], it currently refers to a heterogeneous ensemble of more moderate approaches [Berend, 2020]. For example, the company Xing is being renamed New Work SE, academies are being founded and conferences are being convened. In 2019, the Fraunhofer Institute for Industrial Engineering summarized four central thrusts:

- spatial and temporal flexibilization of work
- agile and project-based forms of organization
- value-based work and the creation of meaning through work
- de-hierarchization, participatory decision-making mechanisms and forms of self-organization [Hofmann, 2019]

All these New Work approaches require organizational and structural measures to create a working environment in which people can work effectively. Before this can happen, it is important that people are cognitively ready to take responsibility and get involved. PE builds on this need to take responsibility and complements or changes the way people think. This can be thought of as installing software on a computer. PE extends the concept of structural empowerment, where employees are very aware of aspects of influence and competence, to include a sense of purpose and self-determination in the workplace. From a psychological point of view and according to the concept of Spreitzer [1995], these two aspects have the same meaning and thus extend the construct of solving problems of domination and distribution. In summary, PE is defined as a motivational construct that manifests itself in four cognitions: Meaning, competence, self-determination and influence and impact [Spreitzer, 1995]. If, for example, the aspect of competence is considered, a motivational transfer of responsibility takes place in PE, instead of being defined only by a role description as before. This means that empowerment rather than delegation is used as a measure of work distribution. In this way, employees are shifted from a passive to an active work role. This changed view of the individual also led to PE [Conger, 1988].

2.4 New Work and Neurodivergence

As already mentioned, the concept of New Work is particularly suitable for neurodivergents [Szulc, 2023]. New Work emphasizes the appreciation of diversity and individuals in the workforce. Organizations can benefit from employing neurodivergent individuals by leveraging the unique perspectives and skills in teams, which supports the promotion of neurodiverse teams. New Work also promotes strengths-based approaches. Here, employees can contribute their individual strengths and abilities as their needs are met in terms of PE, i.e. they feel effective, competent, and empowered to perform tasks, as PE is a subjective, cognitive, and attitudinal process [Conger, 1988]. This is a great benefit for neurodivergent people, as they often have outstanding skills in areas such as pattern recognition, problem solving and specialist knowledge [Houdek, 2022]. New working models also offer more flexibility and room for individual working methods and needs. Especially for people with a form of neurodivergence where routines and certain adaptations are necessary [Gomot, 2012], this offers an enormous advantage [Das, 2021]. Another argument in favor of promoting neurodiverse teams is that innovative solutions to complex problems can be developed through the diversity of mindsets and perspectives [Hackl, 2017]. This is another point on which New Work focuses.

The new working models also promote a culture of collaboration, openness, and empathy, that establishes a supportive environment in which neurodivergent employees can feel comfortable and where they can bring their unique contributions to the team [Berend, 2020]. The positive influence of the exhilarating feeling of this mental state of complete immersion (concentration) and total engagement in an activity (absorption), which happens as if by itself, was already described in 1988 by Csikszentmihaly through the flow theory [Csikszentmihaly, 1988].

3 NEURODIVERGENCE AND ITS IMPACTS ON THE (MODERN) WORKPLACE

3.1 General Impacts

A neurodivergent person faces many obstacles in a neurotypical environment. In interviews conducted by Keil [2024a], the following challenges were mentioned, among others: smells, conversations with colleagues, bright light, and distractions in the open-plan office.

To avoid negative reactions from colleagues to the different way of working and thinking [Das, 2021; Walkowiak, 2021], this group of people uses what is known as masking. This involves a compulsive attempt to conform to social conventions, which consumes a great deal of energy [Weber, 2022]. Furthermore, adaptation is only possible to a limited extent, because not everything can be understood or comprehended. Masking and the constant adaptation associated with it promotes burnout, to which neurodivergents are more prone, as confirmed by a workshop participant in Keil's paper [2024a]:

> *"Unfortunately, we lack self-regulation. We don't realize when we are exhausted. We often overexert ourselves because we don't know or notice our limits. This leads to burnout."*

Figure 5 illustrates the problem in the everyday work of a neurodivergent. The sheep farmer (employer) expects each of his sheep (neurotypical employees) to jump over the fence quickly. The mole (neurodivergent employee) cannot jump over the fence and is worried about the reaction of the farmer, who is already reproaching him that his colleagues can do it better than he can. But the mole can do other things better than jumping - namely digging. The mole immediately finds a solution to get to the other side: he digs a tunnel, which is what he does best.

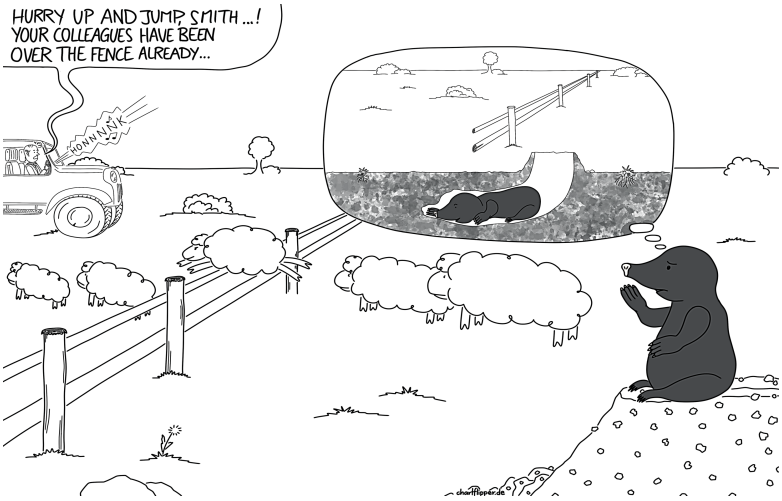

Figure 5: Depiction of neurodivergence in the workplace [Keil, 2024b].

The figure shows that neurodivergents have weaknesses, but also strengths. They may not be able to do everything like their colleagues, but they can quickly find an adequate or even better alternative. This also applies to finding solutions to problems. Neurodivergent people consider many alternatives in a very short time and evaluate them accordingly. This makes them a great asset in the workplace. It is therefore important to create satisfactory conditions for them in the workplace. Unfortunately, society currently perceives neurodivergent people as disabled and only considers the limitations and not the enrichment of this diversity.

The survey conducted by Keil [2024b] on the other hand, shows, that neurodivergent people do not see themselves as disabled. 70% state this and only 18% see themselves as disabled due to their neurodivergence. In addition, only 31% say that they feel (rather) limited in general, while almost 80% even see neurodivergence as an enrichment (see figure 6).

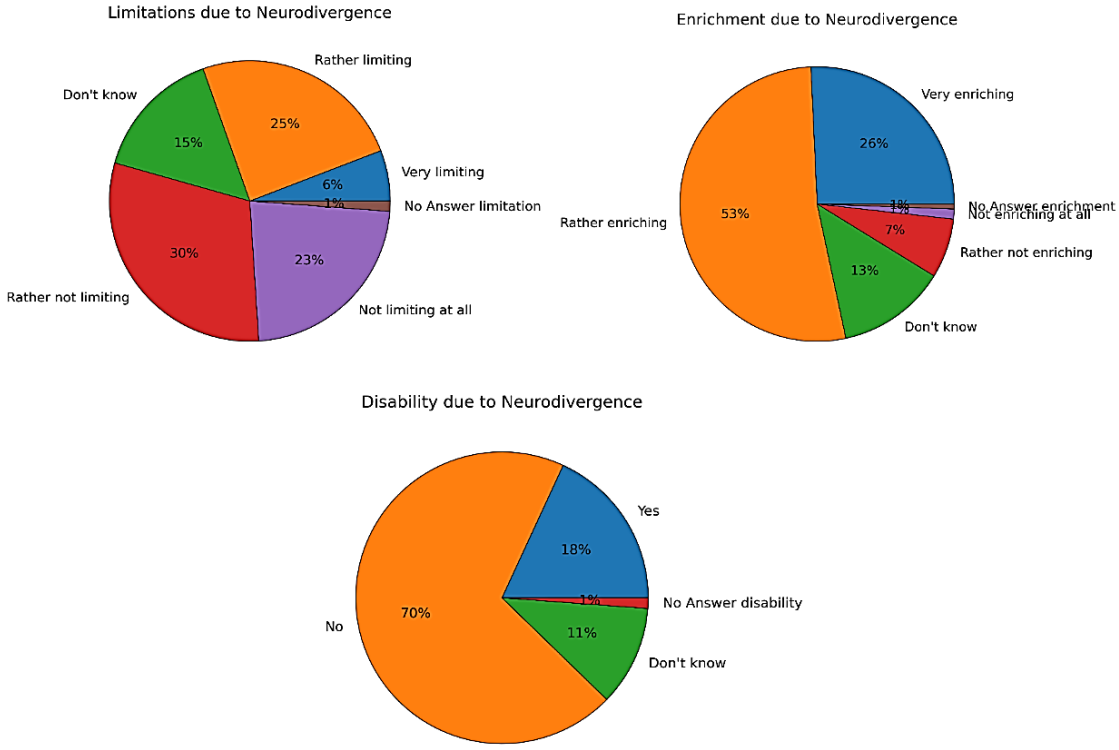

Figure 6: Limitations, enrichment, and disability perceived by neurodivergent people. Results are taken from Keil's [2024b] study on AI-supported UI design for neurodivergent users.

3.2 Neurodiverse Teams and the Era of New Work

The modern way of working is primarily based on asynchronous communication. Phone calls have been replaced by emails and chat messages [Tomczak, 2022]. Since neurodivergents have difficulty reading between the lines [Szulc, 2023] and recognizing tasks in texts, misunderstandings occur in the workplace. Neurotypicals tend not to write tasks in concrete terms to comply with social conventions and polite formalities. As a result, neurodivergent people often do not understand that something is expected of them. They interpret it as general information. At times of presence and thus at times of synchronous communication, it was directly stated if something was not understood and the option of asking a (familiar) colleague if something was unclear was given [Tomczak, 2022]. This type of translation is no longer available. Added to

this is the lack of facial expressions and body language [Das, 2021]. Although neurodivergents also have difficulties reading these, they were still able to better assess certain situations, even if it was only because they noticed an anomaly compared to similar situations.

The problems listed here illustrate the biggest challenge faced by neurodiverse teams: communication [Das, 2021]. In addition to the points already mentioned, neurodivergents often take things literally, which is why allusions, idioms or irony should be avoided, which is certainly a challenge, as in a neurotypical world this often lightens the mood and enables a different level of relationship between the participants.

Another challenge is motivation. Neurodivergent people often have slightly more difficulties motivating themselves compared to neurotypical people (see figure 7 and Tomczak, 2022). If tasks are not distributed within the team according to competencies and needs, the lack of motivation combined with New Work approaches such as working from home (higher risk of distraction) could lead to conflicts as the feeling of meaningfulness and satisfying work does not arise. This is because the mapping of the demands of the work role to one's own beliefs, values and behaviors determines meaningfulness, and therefore a sense of meaningful work only arises when the value of the work goals or purpose is perceived to be high in relation to one's own ideals and standards. In the literature, a three-layer model exists whereby the first layer is determined according to whether employees perceive their work as significant for themselves and their employer, the second layer refers to whether the work is significant for their personal life and the third layer considers whether the work is significant for society, the lives of others and for a higher purpose [Schermuly, 2021]. Schermuly [2021] assigns the problem described regarding the distribution of tasks to the second layer, as this involves the perception of personal significance.

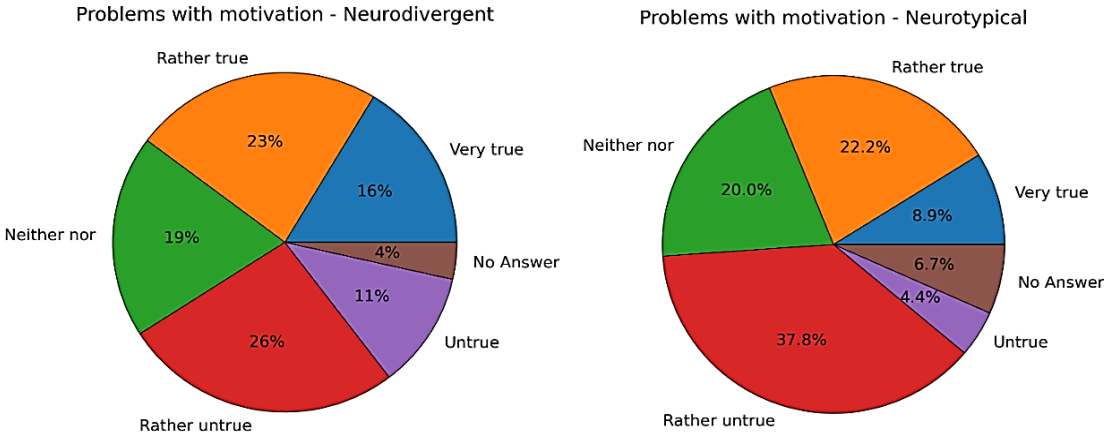

Figure 7: Percentage distribution of neurodivergent (left) and neurotypical (right) study participants and their ability to motivate themselves. Results are taken from Keil's [2024b] study on AI-supported UI design for neurodivergent users.

The presentation and distribution of information also causes difficulties. Neurodivergents find long meetings unpleasant. They want to get all the necessary information quickly and then get on with their work. Small talk is not preferred by them, which is often interpreted by neurotypicals as disinterest or rudeness. Keil [2024a] cited the following quote from an affected person:

> *"In my old job, we had morning huddles every morning for 2-3 hours. This unproductive time always bothered and annoyed me. I always did other things on the side. So please, no small talk meetings where you spend 15 minutes discussing the canteen food."*

These different expectations and different ways of working offer the potential for interpersonal conflicts, which makes collaboration more difficult and therefore reduces productivity. Above all, the different ways of working create the risk that one group of people will quickly be underchallenged and the other overchallenged, which can also lead to conflict.

Remote working, which has become standard in many industries, is also a barrier for neurodiverse teams. For neurodivergent people, this way of working is more important than for neurotypical people, which is why this group is currently campaigning against the reintroduction of compulsory in-office working [Katanich, 2024; SAP Czech Republic]. Neurodivergent people thus can design their working environment in a way that is comfortable for them, to avoid odors and noises, especially through conversations, and to generally reduce sensory overload [Szulc, 2023; Tomczak, 2022]. The following supporting quotes can be found in the paper by Keil [2024a]:

> *"For me, sometimes quiet, irregular noises are worse than loud, monotonous ones. The building site across the street can be less disturbing than the lift and pipes passing by the office. Conversations are particularly bad. Not only do you automatically listen to them, but they are particularly irregular because of the pitch and tone of the voice and because the speaker changes. One could say that irregular sounds are particularly annoying."*
>
> *"A colleague of mine, who is also neurodivergent, has big problems with smells. For example, he can't stand the smell of food. Therefore, we've started to plan meals in the office so that he's on his lunch break at the same time."*

As already mentioned, neurodivergents are more prone to meltdowns due to sensory overload and feel less comfortable around people. Thus, neurodivergents prefer to work remotely and avoid face-to-face meetings [Tomczak, 2022]. Furthermore, they must not be disturbed or prevented from working during hyperfocusing. This is a major problem for

neurodivergent people. They develop physical pain when they are interrupted and taken away from their tasks [Doyle, 2022]. The interruption means they must think again, and this loss of time is a problem for this group of people. It also shows that most neurodivergent people do not want a reminder to take a break during hyperfocus (see figure 8).

This is also supported by the following quote from Keil [2024a]:

> *"I was temporarily placed in a 10-person open-plan office. The noise distracted me so much from my work that I went to my boss and explained that I couldn't work like this. The next day I had a pair of high quality noise-cancelling headphones on my desk, with the comment that they'd understood that I couldn't be disturbed in my tunnel."*

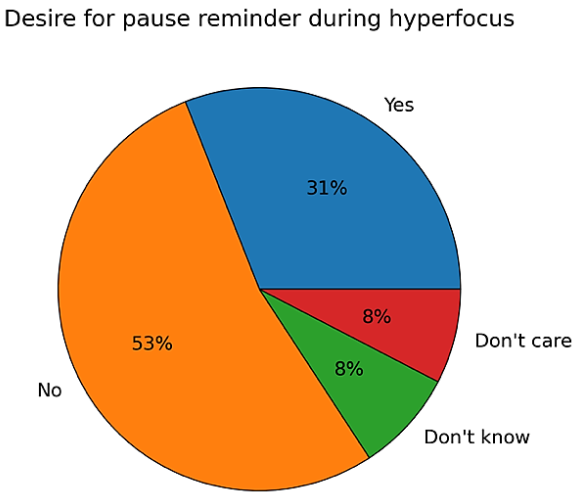

Figure 8: Desire for pause reminder during hyperfocus. Results are taken from Keil's [2024b] study on AI-supported UI design for neurodivergent users.

The basic idea of New Work once again plays a major role here. According to Bergmann [2020], the New Work structures are intended to counteract burnout. As noted, neurodivergent people are prone to burnout. New Work approaches such as avoiding many social interactions through remote working and the possibility of structuring one's working day according to one's needs at least reduce this risk, which benefits the performance of the team as there is less absenteeism. In addition, the study by Kittel-Schneider [2022] shows that neurodivergent people often have concomitant illnesses. If their symptoms increase (e.g. due to physical overload), the negative characteristics of neurodivergence also increase. This illustrates once again that the New Work concepts promote the inclusion of neurodivergent employees or in some cases even make it possible in the first place. However, experts believe that the management level has an obligation to create a New Work-friendly workplace [Hackl, 2017]. An appropriate leadership style, especially digital leadership, is highly relevant for creating a sense of satisfaction at work. Labdays and hackathons, for example, where people spend days focusing on individual innovations, have proven their worth [Schermuly, 2021]. In the field of digital leadership, the use

of AI is already being explored and applied, for example to support managers in their decision-making [Kollmann, 2023; Peifer, 2022; van Quaquebeke, 2023]. Tomczak [2021] has additionally highlighted the positive influence of digital leadership on neurodivergent employees, which again emphasizes that the combination and mutual influence of New Work, neurodivergence and AI must be examined more intensively.

However, New Work concepts require not only digitalization such as remote working, but also a willingness to use communication tools such as MS Teams. The study by Keil [2024b] shows that more than 30% of the participants never use them (see figure 9).

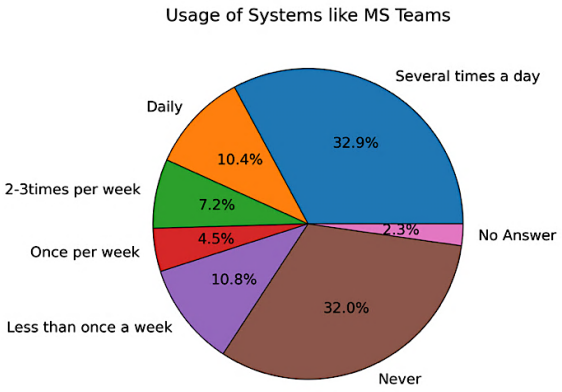

Figure 9: Percentage distribution regarding the usage of systems such as MS Teams. Results are taken from Keil's [2024b] study on AI-supported UI design for neurodivergent users.

However, it is striking that more young people who have grown up with digitalization and come from the neurodivergent community use tools such as MS Teams compared to neurotypical people of the same age (see figure 10). This once again underlines the importance of remote working for the neurodivergent. This promotes the productivity of the team.

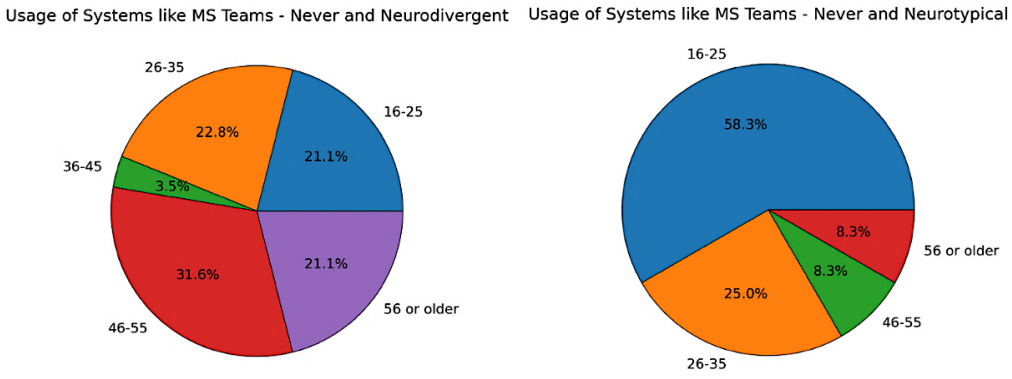

Figure 10: Age-related percentage distribution of neurodivergent (left) and neurotypical (right) study participants who never use systems such as MS Teams. Results are taken from Keil's [2024b] study on AI-supported UI design for neurodivergent users.

However, as mentioned earlier, this creates challenges for teams, especially in terms of communication. But also, in terms of interpersonal relationships. For neurotypicals, this includes developing a positive social structure within the team.

In addition to all the challenges, neurodiversity in the workplace and, above all, neurodiverse teams also offer advantages. Every form of neurocognitive ability has its weaknesses as well as its strengths, which brings new opportunities, especially in terms of innovation and problem solving. People with ADHD often have problems with organization, perceiving details, focusing, prioritizing, and completing tasks [Bewley, 2016], but have incredible strengths in creativity and problem solving. They directly see the big picture and how pieces of the puzzle fit together, even if they do not appear to be connected at first glance [Bruyère, 2022]. This results in long-term solutions. In addition, they provide great added value through their creativity, especially in the ideation phase of design thinking, as they always spontaneously come up with lots of ideas that they can link together accordingly [Abraham, 2006].

People on the autism spectrum often have problems in the areas of social communication and interaction and tend to have fixed routines and behaviors that must not be changed [Bewley, 2016; Carlier, 2020], which is of course a challenge, especially in dynamic working environments. On the other hand, they process information quickly and learn new things relatively quickly. This allows them to quickly become familiar with complex, unfamiliar topics and help develop effective solutions in less time [Gomot, 2012]. They can also accurately store facts and information over a long period of time (a kind of photographic memory), which means that much more information can be considered in long-term projects without having to re-evaluate protocols or the like each time.

Highly gifted people often also show weaknesses in social interactions, but usually also act as translators between the neurotypical and neurodivergent worlds because they can behave well in both worlds. This is due to their extreme curiosity. As a result, they ask a lot of questions and try to understand everything down to the last detail. They identify unanticipated variables and risks so that many potential problems can be addressed early. They are also able to teach themselves certain skills, which means that most training can be eliminated for this group of people, which is important in terms of both time and cost factors in projects [Heylighen, 2012].

These examples show that neurodiverse teams offer great advantages for companies if the challenges can be overcome. Section 5 therefore presents various AI-based approaches to solving at least some of these obstacles.

4 RELATED WORK

There are several publications in the literature regarding neurodiversity in the workplace [Bewley, 2016; Bruyère, 2022; Doyle, 2022] and the enrichment of neurodiversity in groups [Brinzea, 2019; Muskat, 2017]. Here, the strengths of the various neurodivergences are highlighted [Bewley, 2016] and how companies benefit from neurodiverse teams is described [Austin, 2017]. Publications can also be found on New Work and neurodivergence. In their paper, Klinksiek et al. [2023], for example, briefly discuss traits and needs of neurodivergent people and how New Work approaches could have a negative impact on this group of people in terms of concentration and social isolation, but also a positive impact through reduced sensory overload. However, there are no concrete proposals for solutions here. Tomczak et al. [2022] are more specific in their publication, albeit with the restriction that the study only refers to Polish autistic employees and remote working. Here, however, the advantages and disadvantages of the new working methods for neurodivergent people are discussed in more detail. In addition to a reduction in sensory overload and social interactions as positive characteristics, negative influences such as helpful social contacts and motivation problems caused by purely electronic communication are also identified. However, here too, only the problems were identified, but not addressed.

Previous research has generally focused more on how neurodivergent individuals benefit from remote working [Das, 2021; Doyle, 2017; Szulc, 2023; Tomczak, 2022], so that conclusions can be drawn about the benefits of New Work

approaches and neurodivergence. The paper by Das [2021] offers a detailed insight into the challenges of remote working. However, the solutions described are descriptions of those affected who have found a way of working to compensate for the negative effects of remote working. These approaches are helpful hints for developing solutions.

As shown in the literature and in everyday life, remote working and New Work approaches not only bring advantages for neurodiverse teams such as flexible working hours, reduced absenteeism, and the creation of a pleasant working environment [Das, 2021], but also disadvantages such as misunderstandings and communication difficulties due to asynchronous communication, among other things [Klinksiek, 2023; Tomczak, 2022].

As things stand, support from AI to solve these challenges has not yet been considered or investigated. To develop possible solutions, the literature has examined how certain negative characteristics of neurodivergent individuals, such as self-regulation and motivational ability, have been addressed. Various promising approaches were found here.

In their paper, Carlier et al. [2020] present a serious game that uses mini games to calm autistic children in stressful situations and thus reduce the likelihood of meltdowns or shutdowns.

The paper of Walkowiak [2020] investigates how beneficial digital transformation is for neurodivergent employees and how neurodiverse workplaces can benefit from this. It was also mentioned here that AI and neurodiversity belong together.

To address the problem of self-regulation, programs have been developed for smartwatches that support autistic children [Torrado, 2017]. Here, a threshold value is set for the heartbeat measured by the watch, above which the watch detects an increased risk of meltdowns and sends a signal to the wearer to take certain countermeasures such as breathing together.

In various blog entries, those affected also report that games such as Minecraft have a calming effect. Taking advantage of this interest in games, the authors Grund et al. [2020] found that neurodivergent workers can be better motivated to carry out instructions with the help of gamification.

So far, no promising approaches to the problem of time management have been found in research, but the company Time Timer is dedicated to the topic of visual therapy aids. The products have had a great effect on self-regulation and time management, particularly in children. A timer is set for a task and the remaining time is marked in color. This makes use of the fact that neurodivergent people primarily process information via visual stimuli.

Augmented reality and virtual reality are already being used with children in communication skills. Among other things, children learn to interact in a neurotypical world and to understand what is expected of them. Augmented reality is primarily used with children for this challenge. There is even research into how access to this technology needs to be adapted for neurodivergent people [Lukava, 2022; Mai, 2023].

The research and studies to date indicate that a lot is already being done for the inclusion of neurodivergent people to enable and promote a neurodiverse working environment, but many of the challenges posed by New Work approaches in particular have not yet been solved or addressed. In addition, most research focuses on autistic people, which is not sufficient to make a comprehensive statement because, as noted, neurodivergences also manifest differently. A further limitation to date is that methods have often only been applied to children.

Artificial leadership, the combination of AI and digital leadership, has already proven itself in terms of work performance and decision-making at management level [Kollmann, 2023]. In this paper, the authors therefore present approaches to use the opportunities offered by AI to solve the existing challenges and thus increase work performance and strengthen social interaction at the employee level to promote neurodiverse work environments.

5 USAGE OF AI TO OVERCOME CHALLENGES AND EMPOWER OPPORTUNITIES

AI could facilitate the integration of neurodivergent people in the future and help overcome some challenges. As noted, neurodivergent individuals have difficulty recognizing tasks in messages. By analyzing neurotypical texts that contain implicit task assignments, a tagging list could be developed that could be used to train a large language model. This would allow an AI to check messages for tasks and present the specific task to the reader accordingly. In addition, filtering by name and domain could be used to highlight involved areas from which information is either required or which need to receive information. The AI could automatically ask the addressee whether communication has already taken place or is planned with the other people.

The partial lack of self-organization capability was cited as a further obstacle. Here too, AI could provide corresponding added value. The identified tasks could be given an approximate processing time based on experience. Considering any deadlines in the message, the AI can automatically create a blocker for processing the tasks in the calendar and ask the addressee whether this deadline suits them or whether they would like to postpone it. An additional automatic and early reminder of the original deadline could also be entered.

Another challenge is the processing and filtering of information in meetings or longer text messages. AI models such as ChatGPT already enable summaries, but these are not yet adapted to neurodivergent needs, so that irrelevant information is also summarized. Appropriate templates could be developed here and provided with tags so that, for example, tasks are presented in a filtered and clearly formulated manner and the roles involved can be clearly identified.

Communication in general is a major hurdle for neurodiverse teams. The relevance of information for the other group is often a problem. As mentioned, neurodivergent people need certainty and therefore need to know all the details in advance, even those that are not considered too important for neurotypical people. AI could also provide support here. It can check messages for completeness. For example, whether directions are included for an invited appointment - either in the text or as an attachment. Among other things, image recognition methods would have to be used to recognize whether a map has been attached. Furthermore, it is possible to search for an event via times in the text. The aim would therefore be to check messages for certain content or criteria and ask the person sending the message, for example, whether they would like to send the message without a map, agenda or people involved.

AI could also help to reduce stress by being triggered by a smartwatch when the preset heart rate is exceeded [Torrado, 2017]. It could then ask the user whether they would like to complete a monotonous task or play a mini game [Carlier, 2020]. Alternatively, the stress level could also be measured via the mouse movements [Naegelin, 2023] and a suggestion could be generated based on this.

6 LIMITATIONS & DISCUSSION

The AI support presented here is also prone to a few obstacles. On the one hand, it is difficult to identify all the relevant words and phrases to clearly recognize tasks and present them accordingly. Secondly, text messages are always subject to a certain semantics that cannot yet be intercepted by the AI, as we have only achieved weak AI and not strong AI. There is therefore a risk that supposed tasks are passed on to the addressee because the text is misunderstood by the AI. However, this type of support, such as ChatGPT, offers some help with which the reader or user receives hints to check something in any case. They are at least made aware that a To Do could be included and can check and clarify this accordingly.

In addition to the technical possibilities, however, there is also the risk that these applications will be rejected, as people could quickly feel patronized or gain the impression that they are not intelligent enough to communicate or are unable to structure their everyday work. However, as neurodivergent people become more open about their limitations and do less

masking, the usage of such applications will no longer be seen by society as an aid for disabilities, but merely as helpful in avoiding misunderstandings and promoting more efficient workflows.

However, the acceptance of such applications in general is a major challenge, which is why attention must be paid to the implementation and functionality during development. For example, AI applications must not be implemented like a virtual assistant such as Karl Klammer, as only 24% of neurodivergents want a virtual assistant in systems and almost 44% reject this (see figure 11).

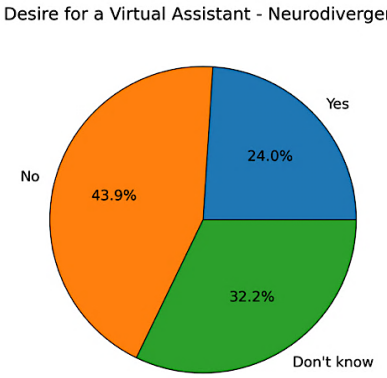

Figure 11: Percentage distribution of neurodivergents' desire for a virtual assistant. Results are taken from Keil's [2024b] study on AI-supported UI design for neurodivergent users.

In addition, information about stress, for example, must not appear as pop-ups, as these have a negative effect on the stress level of neurodivergents (and neurotypicals) (see figure 12). They are disruptive and distracting and therefore do not contribute to relaxation. It should therefore be considered whether such an alert should be sent via a vibration of the watch, a sound on the PC, a text message on the cell phone or by e-mail. To this end, people from the neurodivergent community should be asked what is most effective and least disruptive.

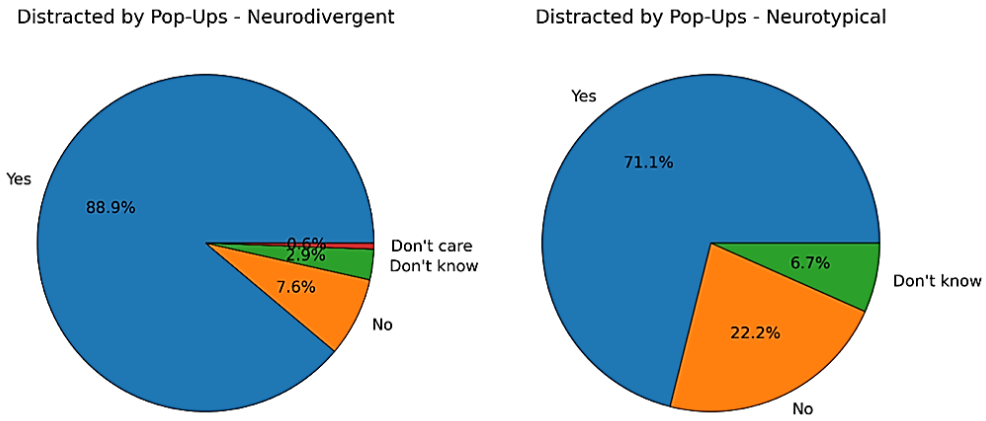

Figure 12: Percentage distribution of neurodivergent (left) and neurotypical (right) study participants regarding distraction by pop-ups. Results are taken from Keil's [2024b] study on AI-supported UI design for neurodivergent users.

7 CONCLUSION

In this paper, the opportunities, and challenges of neurodiverse teams in the era of New Work were highlighted and addressed. Among other things, this means that employees need to develop confidence in themselves to find alternative ways of solving problems. This is particularly important for neurodivergent people, as they are often burdened with self-doubt and at the same time have to consider other options for solving a problem due to their way of thinking and working that deviates from the norm. Therefore, in addition to a supportive manager, psychological empowerment also needs to be practiced. Neurodivergent employees benefit most from New Work measures such as digital leadership, working from home and flexible working time structures, as these offer the opportunity to individualize the workplace and adapt it to specific needs such as avoiding sensory overload. However, psychological empowerment also helps neurotypicals to develop a sense of doing good work, which in turn increases resilience, intrinsic motivation, and a sense of community. This alone can already compensate for some of the disadvantages of decentralized work while working from home.

For other challenges that increasingly arise due to remote work, such as misunderstandings caused by asynchronous communication, solutions based on AI were proposed and discussed. Both neurotypical and neurodivergent people could benefit from the usage of these AI-based solutions. Research and implementation in this direction in the field of AI should therefore be continued to promote neurodiverse teams in the modern workplace, strengthen the benefits and maintain competitiveness, especially in times of a shortage of skilled workers. It would also minimize communication difficulties, which in turn would lead to a better social structure within the team and thus increase work productivity.

However, it is important that all those affected are actively involved in the concrete development and implementation of these proposed solutions by company leaders to avoid later rejection and to specifically promote neurodiversity in the workplace and thus cooperation in neurodiverse teams.

References

Anna Abraham, Sabine Windmann, Georg Siefen and Irene Daum. 2006. Creative thinking in adolescents with attention deficit hyperactivity disorder (ADHD). Child Neuropsychology 12.2: 111-123, doi: https://doi.org/10.1080/09297040500320691

Robert D. Austin and Gary P. Pisano. 2017. Neurodiversity as a competitive advantage, Harvard Business Review, 95(3):96–103, 2017. doi: https://doi.org/10.4324/9781003434610-3

Benjamin Berend and Michaela Brohm-Badry. 2020. New Work: Souveränität im postdigitalen Zeitalter, Wiesbaden: Springer Fachmedien Wiesbaden, doi: https://doi.org/10.1007/978-3-658-29684-1

Frithjof Bergmann and Stella Friedland. 2020: Neue Arbeit kompakt, Freiburg: Arbor

Helen Bewley and Anitha George. 2016. Neurodiversity at work. London: National Institute of Social and Economic Research: 1-68.

Fritz Böhle, Günter Voß and Günter Wachtler. 2018: Handbuch Arbeitssoziologie, Wiesbaden: Springer Fachmedien Wiesbaden, doi: https://doi.org/10.1007/978-3-531-92247-8

Victoria-Mihaela Brinzea. 2019. Encouraging Neurodiversity in the evolving workforce - The next frontier to a diverse workplace, Scientific Bulletin-Economic Sciences/Buletin Stiintific-Seria Stiinte Economice, 18(3), doi: https://doi.org/10.1017/iop.2022.86

Susan M. Bruyère and Adrienne Colella eds. 2022. Neurodiversity in the workplace: Interests, issues, and opportunities, Taylor & Francis. doi: https://doi.org/10.4324/9781003023616-1

Stéphanie Carlier Sara Van der Paelt, Femke Ongenae, Femke De Backere and Filip De Turck. 2020. Empowering children with ASD and their parents: Design of a serious game for anxiety and stress reduction. Sensors 20.4: 966, doi: https://doi.org/10.3390/s20040966

Jay A. Conger and Rabindra N. Kanungo. 1988. The empowerment process: Integrating theory and practice. Academy of management review 13.3: 471-482, doi: https://doi.org/10.5465/amr.1988.4306983

Mihaly Csikszentmihaly. 1988. The flow experience and its significance for human psychology. Optimal experience: Psychological studies of flow in consciousness 2: 15-35, doi: https://doi.org/10.1017/cbo9780511621956.002

Maitraye Das, John Tang, Kathryn E. Ringland and Anne Marie Piper. 2021. Towards accessible remote work: Understanding work-from-home practices of neurodivergent professionals. Proceedings of the ACM on Human-Computer Interaction 5.CSCW1: 1-30, doi: https://doi.org/10.1145/3449282

Caroline Downes and Eileen Koekemoer. 2011. Work-life balance policies: Challenges and benefits associated with implementing flexitime. SA Journal of Human Resource Management 9.1: 1-13, doi: https://doi.org/10.4102/sajhrm.v9i1.382

Nancy Doyle. 2022. Adapting other internal organizational resources to a neurodiverse workforce, In: Bruyère, S. M. and Colella, A. (Ed*.),* Neurodiversity in the Workplace, Taylor & Francis, (pp. 267-294). doi: https://doi.org/10.4324/9781003023616-11

Nancy Doyle and Ashley Weinberg. 2017. Psychology at work: Improving wellbeing and productivity in the workplace. The British Psychological Society, doi: https://doi.org/10.53841/bpsrep.2017.inf287

Derek Eldridge and Tahir M. Nisar. 2011. Employee and organizational impacts of flexitime work arrangements. Relations industrielles 66.2: 213-234, doi: https://doi.org/10.7202/1006144ar

Harald Gatterer. 2022. Die Megatrend-Map, <https://www.zukunftsinstitut.de/dossier/megatrends/#12-megatrends>

Marie Gomot and Bruno Wicker. 2012. A challenging, unpredictable world for people with autism spectrum disorder. International Journal of Psychophysiology 83.2: 240-247, doi: https://doi.org/10.1016/j.ijpsycho.2011.09.017

Jonas Grund et al. 2020. A gamified and adaptive learning system for neurodivergent workers in electronic assembling tasks. Proceedings of Mensch und Computer 2020. 491-494, doi: https://doi.org/10.1145/3404983.3410420

Jarrod M. Haar. 2007. Exploring the benefits and use of flexitime: similarities and differences. Qualitative Research in Accounting & Management 4.1: 69-82, doi: https://doi.org/10.1108/11766090710732514

Benedikt Hackl, Marc Wagner and Lars Attmer. 2017. New Work: Auf dem Weg zur neuen Arbeitswelt, Wiesbaden: Springer Fachmedien Wiesbaden, 2017, doi: https://doi.org/10.1007/978-3-658-16266-5

Marc Helmold. 2021. Introduction to the New Work Concept. New Work, Transformational and Virtual Leadership: Lessons from COVID-19 and Other Crises: 1-17, doi: https://doi.org/10.1007/978-3-030-63315-8

Francis Heylighen. 2012. Gifted people and their problems. Davidson Institute for Talent Development 1.2 (2012): 1-12.

Josephine Hofmann, Alexander Piele and Christian Piele. 2019. New Work. Best practices und Zukunftmodelle

HRK News Bureau. 2024. SAP calls employees to office for 3 days a week. https://www.hrkatha.com/news/sap-calls-employees-to-office-for-3-days-a-week/#:~:text=The%20German%20IT%20giant%2C%20SAP,a%20week%2C%20starting%20in%20January.

Petr Houdek. 2022. Neurodiversity in (not only) public organizations: an untapped opportunity?. Administration & Society, 54(9), 1848-1871. doi: https://doi.org/10.1177/00953997211069915

Doloresz Katanich. 2024. ‘We feel betrayed’: SAP workers rebel against forced return to the office. https://www.euronews.com/business/2024/02/02/we-feel-betrayed-sap-workers-rebel-against-forced-return-to-the-office

Mareike Keil. 2024. Empowering Neurodivergents - Leveraging Digital Twins and Digital Human Models to Facilitate Workplace Inclusion and Enhance Communication. NordDesign 2024. *In Review*

Mareike Keil. 2024. AI-Supported UI Design for Enhanced Development of Neurodiverse-Friendly IT-Systems. NordDesign 2024. *In Review*

Sarah Kittel-Schneider, Gara Arteaga-Henriquez, Alejandro A. Vasquez, Phil Asherson, Tobias Banaschewsk, Isabell Brikell et al. 2022. Non-mental diseases associated with ADHD across the lifespan: Fidgety Philipp and Pippi Longstocking at risk of multimorbidity?, Neuroscience & Biobehavioral Reviews, 132, pp.1157-1180, doi: https://doi.org/10.1016/j.neubiorev.2021.10.035

Ive D. Klinksiek, Eline Jammaers and Laurent Taskin. 2023. A framework for disability in the new ways of working. Human Resource Management Review 33.2: 100954, doi: https://doi.org/10.1016/j.hrmr.2023.100954

Tobias Kollmann, Kilian Kollmann, and Niklas Kollmann. 2023. Artificial Leadership: Digital Transformation as a Leadership Task between the Chief Digital Officer and Artificial Intelligence. Int. Journal of Business Science and Applied Management 18.1.

Peter Kruse. 2004. Next practice. Erfolgreiches Management von Instabilität. Gabal, Offenbach am Main, 151, ISBN 978-3-86936-962-4

Tamari Lukava, Dafne Zuleima Morgado Ramirez and Giulia Barbareschi. 2022. Two sides of the same coin: accessibility practices and neurodivergent users' experience of extended reality. Journal of Enabling Technologies, 16(2), 75-90. doi: https://doi.org/10.1108/jet-03-2022-0025

Linh Tuan Mai, David Gollasch, Constantin Boß and Heiko Werdin. 2023. Transferring Real Operating Concepts Into Virtual Reality for Neurodiverse Learners

Barbara Muskat. 2017. Celebrating neurodiversity: An often-overlooked difference in group work. Social Work with Groups 40.1-2: 81-84, doi: http://dx.doi.org/10.1080/01609513.2015.1067131© 2017 Taylor & Francis Group, LLC

Mara Naegelin., Raphael P. Weibel, Jasmin I. Kerr, Victor R. Schinazi, Roberto La Marca, Florian von Wangenheim, Christoph Hoelscher, and Andrea Ferrario. 2023. An interpretable machine learning approach to multimodal stress detection in a simulated office environment. Journal of Biomedical Informatics, 139, p.104299, doi: https://doi.org/10.1016/j.jbi.2023.104299

Michael Orsini. 2012. Autism, neurodiversity and the welfare state: The challenges of accommodating neurological difference, Canadian Journal of Political Science/Revue canadienne de science politique, 45(4), 805-827. doi: https://doi.org/10.1017/s000842391200100x

Yannick Peifer, Tim Jeske, and Sven Hille. 2022. Artificial intelligence and its impact on leaders and leadership. Procedia Computer Science 200: 1024-1030, doi: https://doi.org/10.1016/j.procs.2022.01.301

Veronica Popovici and Alina-Lavinia Popovici. 2020. Remote work revolution: Current opportunities and challenges for organizations. Ovidius Univ. Ann. Econ. Sci. Ser 20: 468-472.

Niels van Quaquebeke and Fabiola H. Gerpott. 2023. The Now, New, and Next of Digital Leadership: How Artificial Intelligence (AI) Will Take Over and Change Leadership as We Know It. Journal of Leadership & Organizational Studies: 15480518231181731, doi: 10.1177/15480518231181731

Carsten C. Schermuly. 2021. New Work – Gute Arbeit gestalten, doi: https://doi.org/10.34157/9783648150030

Gretchen M. Spreitzer. 1995. An empirical test of a comprehensive model of intrapersonal empowerment in the workplace. American journal of community psychology 23.5: 601-629, doi: https://doi.org/10.1007/bf02506984

Michael Stuber. 2014. Diversity & Inclusion: Das Potenzial-Prinzip. Ungleich Besser: Das Beste aus 15 Jahren Forschung & Praxis, 3. aktualisierte, ergänzte und überarbeitete Auflage. 978-3-8440-2832-4

Joanna Maria Szulc, Frances-Louise McGregor and Emine Cakir. 2023. Neurodiversity and remote work in times of crisis: lessons for HR. Personnel Review 52.6 (2023): 1677-1692, doi: https://doi.org/10.1108/pr-06-2021-0469

Michal T. Tomczak. 2021. Employees with autism spectrum disorders in the digitized work environment: Perspectives for the future. Journal of disability policy studies 31.4: 195-205, doi: https://doi.org/10.1177/1044207320919945

Michal T. Tomczak, Elias Mpofu and Nathan Hutson. 2022. Remote work support needs of employees with Autism Spectrum Disorder in Poland: Perspectives of individuals with autism and their coworkers. International journal of environmental research and public health 19.17: 10982, doi: https://doi.org/10.3390/ijerph191710982

Juan C. Torrado, Javier Gomez and Germán Montoro. 2017. Emotional self-regulation of individuals with autism spectrum disorders: smartwatches for monitoring and interaction. Sensors 17.6: 1359, doi: https://doi.org/10.3390/s17061359

Emmanuelle Walkowiak. 2021. Neurodiversity of the workforce and digital transformation: The case of inclusion of autistic workers at the workplace. Technological Forecasting and Social Change 168: 120739, doi: https://doi.org/10.1016/j.techfore.2021.120739

Clara Weber, Beate Krieger, Eunji Häne, Joanna Yarker and Almuth McDowall. 2022. Physical workplace adjustments to support neurodivergent workers: A systematic review, *Applied Psychology*. doi: https://doi.org/10.1111/apps.12431

Patrice Wyrsch, Julia de Groote and Andreas Hack. 2020. Hoch(neuro)sensitive Mitarbeitende: Weicheier oder Wunderkinder?, Bern Open Publishing.