Blending Methods: Developing Participatory Design Sessions for Autistic Children

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ABSTRACT
Over the past two years, we have engaged autistic children in a participatory design (PD) process to create their own, individual smart object. In this paper, we reflect on our methodological choices and how these came about. Describing the design process with one of our participants as a case, we show how we developed participatory activities by combining, blending, re-interpreting and adapting techniques and tools from a pool of methods on the basis of the characteristics of the child, our own skills as designers and the history and context of our collaboration. Reflecting on this practice retrospectively, we seek to make two contributions: firstly, we distill a repertoire of methodological building blocks which draw on our experience of co-designing with autistic children. Secondly, we present a visual tool that captures the process by which we combined, blended and interpreted these building blocks into coherent design activities with a view to provide systematic guidance for future work. While the work presented here is set within the context of designing with autistic children, we argue that the underlying approach can be applicable and useful in a wider co-design context.

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participatory design; autism; children

INTRODUCTION
Participatory Design (PD) constitutes an approach and a vision that argues for involving people affected by technologies in their design [10]. Motivations for adopting a participatory approach range from addressing a pragmatic need to increase the fit between features and users' requirements to idealistic agendas related to empower people, democratise innovation and designing alternative futures [18]. Whatever the orientation, the diversification of contexts and goals for which technologies are designed has led PD to become a central theme in the research culture and practice of HCI and particularly in interaction design and children [9].

There is a consensus that PD is particularly powerful when creating technology for groups who are typically marginalised in design and have life-worlds which are far removed from those of designers and researchers. Autistic children[1] are one prime example of such a group and a number of research efforts have sought to co-design technology in this context. While the PD literature is brimming with different methods and techniques on how to engage participants, the rationale for methodological choices and the strategies for translating methods into actual activities are hardly ever reported on, impacting on our collective ability to effectively build on each others work. With certain participant groups, such as autistic children, the significance of this gap becomes particularly apparent as there is a constant need to adapt and re-interpret existing methods to consider needs and abilities of participants in order to find ways of facilitating safe and inspiring engagement.

Thus, in this paper, we reflect on our own methodological choices within OutsideTheBox in which we engaged autistic children in a participatory process to design their own smart object. While our project set out to implement existing PD methods for engagement with autistic children, after two years we found ourselves working in different ways: much more akin to tapping into an extending toolbox or repertoire, we found ourselves blending different smaller, methodological building blocks and tools in a fluid and agile manner, responding to how the design process unfolded. Retrospectively, we now reflect on our practice and investigate what we have done in which way and why.

Below we describe in detail the design case of Mia, an 8 year old autistic girl, who worked with us over the course of one school year. We focus on the sequence of participatory activities we designed for the work with Mia and show how we took elements of methods, appropriated, mixed and blended them to iteratively develop a coherent string of activities for meetings. In doing so, we not only continuously extended our own repertoire of building blocks, but also a child-specific

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[1] We are aware about the complex discussions surrounding person-first vs. label-first language; we opt for the latter, due to it being the predominantly self-chosen form of people on the spectrum [16].

repertoire of proven and working elements that we could tap into for future sessions. With the aim to capture this way of working, and provide systematic guidance for future work and others, we here present a visual tool that resulted from analysing our processes after the fact.

The contribution this paper seeks to make is twofold: firstly, we present and discuss this visual tool for designers and demonstrate its possible use. Secondly, we revisit all our processes in OutsideTheBox and distill an overall repertoire of techniques and tools for participatory design with autistic children from the experiences we have made over the last two years.

In the following, we review related work, both on frameworks to make methodological choices as well as concerning the adaptation of methods to particular contexts. We then introduce OutsideTheBox to set the scene for our design case. From this description, we draw out the concept for the visual tool for designers and exemplify its potential use by describing how it could have supported the systematic transition from one session to another.

Finally, we take a step back and collect all methodological building blocks we used across the whole project. We close by discussing how we intend to use this process in our future work and how it might be useful in other contexts.

RELEVANT WORK

Autism is a neuro-developmental condition which manifests itself in impaired social and communication skills, and repetitive and monotropic thought patterns or behaviours. While these manifestations comprise the diagnostic criteria, the way they play out make autistic people an extremely heterogeneous group with very diverse life-worlds. The spectrum of abilities ranges from people who never develop language to people who's autism has only minor impact on their life. The prevalence of Autism-Spectrum Conditions (ASCs) is estimated to be above 1% [1].

Many autistic people have an affinity to technology, as they appreciate the structure and predictability of the medium [5]. This has sparked research interest in computer-based learning interventions [22], as well as the development of technologies which target every-day routines and functional support (see [17] for a recent survey of interactive technologies for autism).

It is widely acknowledged that participatory approaches to designing technology are particularly valuable in an autism context, not only in terms of creating meaningful technology, but also for the enriching and empowering experiences of participants in the design process [15, 28, 3, 21]. However, the typical traits in autism also make facilitating participation in design work particularly challenging. Special interests, rigidity and perfectionism as well as design's features as a socially demanding activity are all considerations to be taken into account [11].

Consequently, methods for engagement and design work require careful adaptation and re-interpretation when working with autistic children. IDEAS, for example, is a participatory design approach that builds on the widely used TEACCH intervention programme [20] to provide specific structures and supports to involve autistic children [2]. The same authors have aimed to widen the applicability of their approach and have proposed the D4D framework (Designing for Diversity) which consists of two main strategies to adapt participatory design activities for a neuro-diverse population: structuring the environment and providing additional supports [4]. With respect to both elements, they highlight how "understanding the culture" can help adapting the activities to the general characteristics of a neuro-diverse population and how "tailoring to the individual" requires designers to respond to the particular needs of the participants.

The CiC framework (Children in the Centre) provides a way of structuring collaboration in multi-discplinary PD projects with special needs children through nested layers of influence [14]. At its core, it is concerned about the interests, strengths and needs of the child. At the outer levels, it includes teachers and parents, before moving on to child-centred technologies, everyday environments and inclusion in society as a whole. The authors acknowledge that while CiC provides valuable perspectives on the arenas of participation, it does not provide a systematic way of developing actual activities.

Gaudion et al., discuss a designer's approach to involving autistic adults in co-creation processes [13]. They describe their methodology as being driven by their designerly, empathic understanding, rather than by preselected methods. As a lens for reflection on their activities, they used the framework for organising techniques and tools in PD proposed by Sanders et al. [23].

Summarising, with our paper we build on Benton's work [2], the CiC framework [14] and Gaudion et al. [13] who all highlighted the need to adapt methods to the children and their environment, in order to be able to engage them in design processes. However, we argue that we lack a more holistic view that transparently and systematically incorporates the designer's expertise and experiences as well as a historical perspective that reflects the course of the collaboration and previous results to develop a coherent series of design activities. Additionally, we see value in building repertoires of method elements that designers can readily tap into and appropriate as the collaboration unfolds. With this paper we aim to address precisely this gap.

OUTSIDETHEBOX

OutsideTheBox - Rethinking Assistive Technologies with Children with Autism[2] is a three year research project, exploring alternative roles for technologies in the lives of autistic children. We argue that traditional assistive technologies have predominately focused on mitigating functional limitations and have consequently ignored a rich and versatile design space for creating technology that is driven by desires and ideas beyond those related to the disability. While limitations certainly are one part of the disabled experience, we argue that they should not narrowly determine the kinds of technologies designed in this space. Consequently, OutsideTheBox takes a

[2] http://ousidethebox.at

Figure 1. Mia's alarm clock (right) and several impressions from its development

different approach and engages autistic children in a participatory design process which has two simple requirements in its brief: firstly, the resulting artefact should afford meaningful and positive experiences and secondly, the design should scaffold the child in sharing these experiences with others.

Children we work with are between 6 and 8 years old and are diagnosed with an Autism Spectrum Condition. All children attend an integrative mainstream school and we collaborate with the education department of the City of Vienna for recruiting. We meet children approximately every fortnight for a co-design session, which results in 12-16 meetings over the school year. In these sessions, two researchers are present which have distinct roles: one is the Play Partner of the child who teams up with the child to work through the planned activity; the other is the Active Observer who sets tasks, keeps the time, provides materials and collects observational data. The technological opportunity space this project chooses to explore is ubiquitous computing and the collaboration spans all across ideation, conceptualisation, prototyping and evaluation. At the end, each child owns their smart object.

The outcome of the project is threefold: firstly, we explore different participatory methods to engage autistic children and enable them to lead the design process with their ideas [19, 27]. Secondly, we create a series of design case studies through which we seek to demonstrate that such an approach leads to very different kinds of technologies, opening a design space that would be inaccessible to neuro-typical, adult designers [12, 26]. Thirdly, we work on novel ways of evaluating the experience children have with these novel kinds of technologies [24, 25].

In the following, we introduce a case study from the second year. Overall, we worked with 9 children and we have chosen to present Mia's[3] case here because of the variety of methods we used and the high degree of their appropriation, making it a rich and fitting example for our argument. In the second year, we also had established our design practice in a more systematic way and Mia's case in particular helped us to reflect on our strategies in developing a coherent string of workshop activities. All processes were thoroughly documented using audio, video, pictures, artefacts and research diaries.

[3]We altered all names to protect the privacy of participants.

CASE STUDY

At the time of our collaboration, Mia was 8 years old. She had been diagnosed with Autism Spectrum Condition two years earlier. Before we met her for the first time, we conducted contextual interviews with Mia's mother, her teacher, and her mentor, who described Mia's difficulties to follow teaching lessons, but emphasised her imaginative skills. Mia became easily overwhelmed by pressure during lessons and subsequently quickly lost her motivation to try new things. As we got to know Mia, we encountered her great drawing skills and her highly focused interest on the Super Mario Universe. She also told us about her difficulties to get up early in the morning and that she linked this to her low motivation and bad mood at school.

Our co-design process stretched over an entire school year, during which we met Mia approximately every fortnight - 16 sessions in total. At the beginning our collaboration took place primarily at school, in a separate room next to her classroom. The room allowed us to freely arrange tables and seats, assigning different areas for brainstorming, role playing or prototyping. Her teacher was not present in the sessions, but available at any time. In particular, the teacher helped to initiate sessions by handing Mia her project folder when the researchers picked her up and Mia insisted on reporting back to the teacher immediately after each session about what she worked on. Towards the end of the design process we also met Mia repeatedly at our research lab to make use of digital fabrication tools.

Based on the initial information from the interviews and our first meetings, we started developing a repertoire of appropriate techniques and tools. Mia's great imagination and interest in pretend play with her toys from the Super Mario Universe, led us to reinterpret techniques from drama based methods (c.f., [6]). We combined those with different common design techniques e.g. brainstorming, mind mapping, research diaries for idea generation and low-tech prototyping for conceptualisation. When ideas became more concrete, we added techniques around collaborative making and digital fabrication.

During the whole co-design process we consistently tailored elements of the techniques to fit Mia's individual characteristics, her particular needs and the ideas generated in previous sessions. For example, since Mia always brought her favourite toys from the Super Mario Universe to our meetings,

Figure 2. An overview of the design process with Mia

Method Element	Rationale	Child	Adapted Element
Warm up	comfortable working atmosphere	preference for routines and rituals	schedule of reflecting on the last session, ritual of grimacing at the beginning
Technology immersion	novel interaction possibilities	strong need for structure, overwhelmed by too many options	step by step introduction of materials
Prototyping	converging on technology	low motivation to work with technologies	prototyping as prop design for established role play
Role play	motivation, novel ideas	pretend play with toys	incorporating toys as characters in role play
Scenario building	motivation, proof of concept	difficulty of wake up in the morning	wake up scenario
Mapping	specification of materials	toys	involving toys in brainstorming activities

Table 1. Summary of planned methodological elements for session 10, the rationale for including them and how they were adapted to the child. Elements listed here also became part of the repertoire as described further below

we started to give them a role in the process and would ask their opinion about ideas. The toys were also involved in role play activities, intended to enable us to test first prototypes in specific scenarios. Working with Mia meant to be mindful of her attention spans and to include a sufficient number of breaks to play soccer or talk about other things on her mind. To "warm up" at the beginning of each session the Play Partner and Mia established a routine of grimacing and posing for the pictures the Active Observer took for the research diary, before reflecting on the last session. During the collaboration it also emerged that she regularly produces short pieces of text and pictures, that she assembles for her newspaper for her class mates. We picked up on this idea in the evaluation of the object for which she produced an advertisement and wrote an article about our collaboration. For this she also conducted a couple of interviews with her family and our research team about the final prototype (see also [27] for a more detailed account).

Based on Mia's desire "to start her day in a good mood" and her current difficulties to get up in the morning, we developed the idea of a personalised alarm clock which consists of three components: 1) the alarm clock itself showing the time and providing a mechanism to set an alarm; 2) a pillow that starts shaking once the alarm goes off and 3) a floor mat that is used to turn the alarm off. The alarm clock plays Mia's favourite tune of the Super Mario Universe followed by a short melody that provides a "mood-forecast" for the day, inspired by her fascination of reading the daily horoscope. There is no traditional clock-face or digital display on the main device. Instead, its form is inspired by a Super Mario figure and includes several LEDs and buttons that are used to indicate the time and set an alarm. Figure 1 provides pictures from design sessions and the final object.

To be able to illustrate the process we went through to develop a particular session, we now provide a detailed account of the build-up to our 10th meeting. As figure 2 shows, we have chosen a session that marks the transition from conceptualisation towards prototyping, i.e. we were aiming to converge on a specific concept that could be taken further into the development of a smart object. This phase within the design process offers a good example as we had already worked with the child for some time, had established a trusting relationship with Mia and had explored her interests and ideas in various directions. We illustrate how we developed the subsequent session that would build on this experience *and* would push the design process into the next phase. We first describe our planning of the session and then how the session unfolded in practice.

Planning a session

In previous work with Mia we identified a strong preference for routines and concise tasks as new, unknown materials or topics were overwhelming. Mia enjoyed our rituals and routines at the beginning and the end of our sessions: a short review of today's schedule, grimacing and posing, involving her toys in role-play activities, and presenting the outcomes of the session to her teacher. During the conceptualisation activities, we established a consistent scenario of a "wake up" situation to test various ideas. In the 9th session, Mia developed the concept of her own smart alarm clock and built the first card board prototype. It combined basic functions of an alarm clock she had at home with new ideas, such as Super Mario Music and a shaking pillow. We built these prototypes out of a necessity for props in acting out the "wake up" scenario.

Since these ideas were rooted in very classical aesthetic and functional expectations, our 10th session had the aim to carefully open up the design space. To explore more potential

forms and functions of the whole alarm system we chose to combine elements of technology immersion (as in [8]) with our established role-play activities to develop hybrid, semi-functional prototypes. To this end we planned to introduce LittleBits[4], an easy to use electronic tool kit that allows creating simple sensor-actuator systems by combining ready-made building blocks.

Next to the established routines (reviewing pictures from the last session and documenting what we have done in the end), we created a space for discussing the previous 'research exercise' and tasks Mia might have completed in between sessions, if she wanted to.

We planned to introduce LittleBits, since they offer a large choice of inputs and outputs and could broaden Mia's understanding of the interactive potential of her alarm system. However, we expected that introducing them all at once would have overwhelmed Mia and have an intimidating effect on her contrary to the empowering and inspiring effect we desired. Hence, engaging with the LittleBits was facilitated in two distinct phases: First, an exploration of possibilities and second, the determined use of LittleBits as design material. This would ensure that Mia would feel comfortable with the material when using it in her own creation. We planned to hand out a subset of sensors and actuators along a set of tasks with increasing complexity. At the start, we would first show different sensors and let her choose any except buttons to encourage her to step out of well-known interaction paradigms. Then, she would have to combine two input modes until she was free to explore different combinations on her own. When she would feel comfortable in that exploration, we would suggest thinking about the LittleBits together with the cardboard prototypes from the last session in order to create hybrid prototypes that were also semi-functional.

These hybrid prototypes would then function as props for another play-through of the "wake-up" scenario. Mia could explore how the semi-functional props took up some of the pretend play and we could observe how well these worked. Additionally, we could see how she would integrate potentially new interaction paradigms in her play and subsequent morning routine. These play-throughs would also help to iteratively test the generated ideas in a well-known scenario. We would then assemble a list of materials required to build the system. This would tell us more about Mia's mental model of the important parts of the alarm clock and the vibrating cushion. Through the discussion of components at this level, we would learn more about how Mia specified her invention and make decisions that are often made implicitly by designers explicit, which opens them up for collaboration.

Table 1 summarises the elements that we planned on using, alongside with the basic rationale and how they were adapted.

How the session unfolded

At the beginning of the actual session Mia was tired and in a bad mood. The Active Observer gave her space to talk about her concerns and only then presented her with the photographs of the last session. Mia and her Play Partner started to laugh and grimaced again. This warm up routine not only helped Mia to feel comfortable, but it also sparked her enthusiasm to work with us.

The Active Observer first gave a systematic overview over the diverse electronic features the LittleBits offer. Then Mia tested each component one by one along given tasks, increasing in complexity according to our plan. She then was asked to choose four different sensors or buttons as appropriate functions for the designed alarm clock. At first, she was confused about this task and did not know how to make an informed decision. Encouraged by her design team, formed by her Play Partner and her toys, Yoshi and Toad from the Super Mario Universe, they made a decision. She enthusiastically played out how Yoshi and Toad offer their opinions on the different features of the various electronic components, giving her a vehicle to structurally debate advantages and disadvantages of each single component.

However, afterwards she refused to create props including the chosen components. Mia wanted to skip the prototyping activities and move directly to the next activity on the schedule, her favourite task of acting out of the "wake up" scenario. The Active Observer decided to move on and suggested to act out this well known scenario and then continue to make new props for it.

In preparing the scene, Mia and her Play Partner chose cardboard, cloths and bubble wrap as materials for the alarm clock. The Active Observer offered them on a separate table. Prototyping with electronic components merged with role-play and the known scenario framed our activities, offering Mia more structure to feel safe while being confronted with a variety of materials and the unknown complexity of LittleBits. Acting happily in the known role, Mia came up with new ideas for her alarm system that resulted from her exposure to simple electronics and the interaction with the resulting hybrid prototypes.

For example, while she danced to the alarm music, she decided to turn off the alarm clock by stepping onto a mat. This was inspired by the haptic affordances of the bubble wrap placed under a cardboard. We could then establish together that we would need a sensor under that mat that recognises her standing on it. While she set an alarm at six o'clock in the morning, Mia showed that she preferred having one button that she would press six times. At the end of the session she was very excited to present her new ideas to the teacher.

Describing the session in practice gives a detailed impression on how our preparations addressed Mia's specific needs and how ad-hoc changes to our plans stemmed from previous experiences, the separation of our own roles, our expertise and the existing methodological repertoire.

A VISUAL SESSION PLANNING TOOL

Reflecting on our own process of how we planned sessions, we created a visual tool intended to support designers in developing participatory design activities in a similar manner. The tool allows to systematically blend methodological building blocks and appropriate them from five main perspectives: the child, the designers, the context, previous work and available

[4] http://littlebits.cc

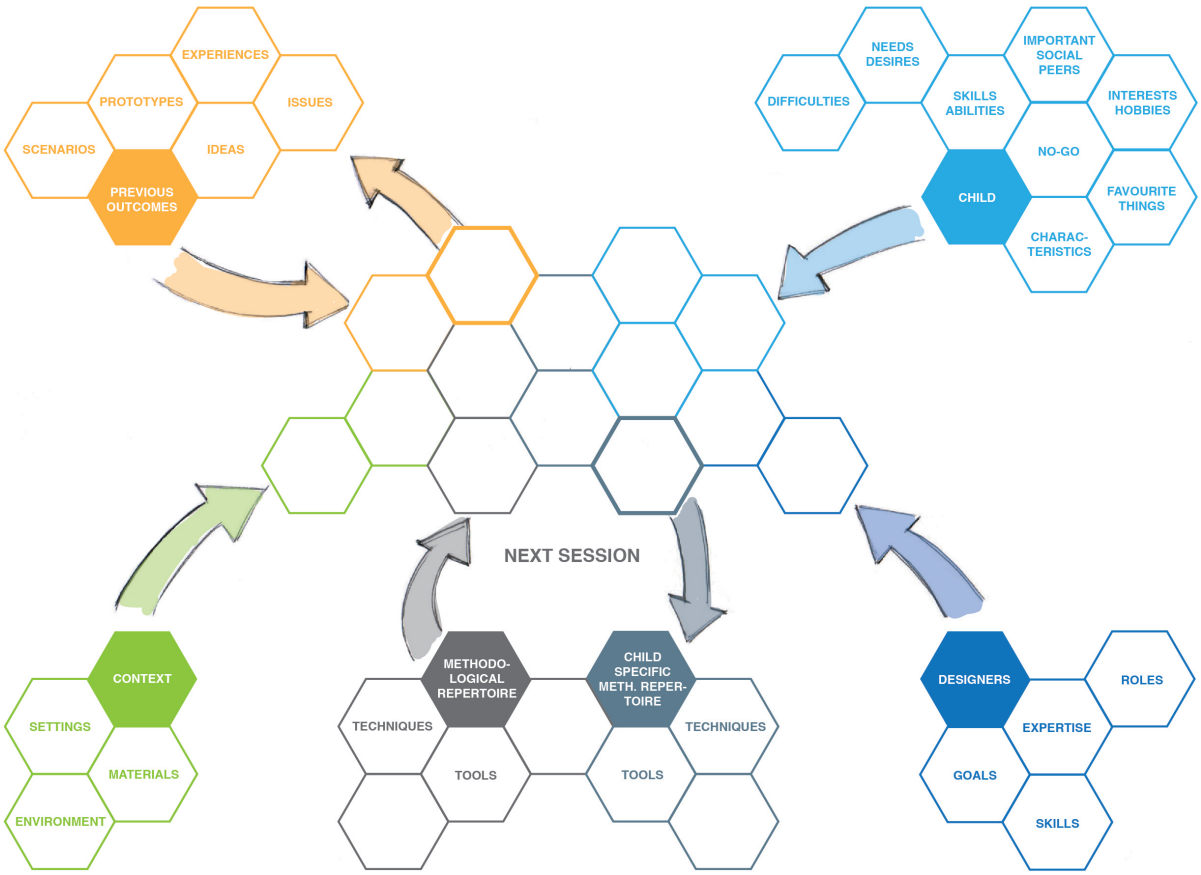

Figure 3. Blueprint of the visual tool

methodological repertoires. The format of the tool is inspired by a board game with hexagonal cards of different colours which can be arranged and re-arranged on a grid to guide designers in constructing a holistic picture of diverse perspectives of considerations that influence planning. The cards themselves can be re-used and adapted to fit other contexts. Figure 3 presents the blue print of the tool.

The playing field at the centre of Figure 3 is where cards from the five perspectives can be combined. There exist two distinct **methodological repertoires** from which designers can take techniques and tools to start planning: one is the general repertoire which is filled by techniques and tools the designers are familiar with or that exist in literature. The second is a repertoire that is built up over the time of collaboration with this specific child. It consists of techniques and tools that already were interpreted for this child and the context. **Child cards** describe specific characteristics of the child. The majority of child cards gets generated at the begin of a collaboration, based on the profile and contextual enquiry. However, new cards can be added as the collaboration unfolds and designers foster a stronger relationship with the child. Cards that capture **previous outcomes** represent ideas, issues, prototypes or scenarios that can be referred to or built upon. **Context cards** describe the physical setting in which the work takes place, the available range of raw materials and more broadly the relevant context in which the work is being conducted (project structure, schools etc). The final group of cards describes the perspective of the **designers**. In particular, this includes their goals, expertise, skills and the different roles they assume in the collaboration.

In planning a session, designers start choosing tools and techniques from the methodological repertoires that support the overall aim of the next session. Next, cards from the remaining four categories are brought in to describe the ways in which the methodological building blocks need to be merged, adapted or re-interpreted. This can lead to the creation of new cards representing child-specific techniques or tools, which are derived from those in the generic pool. Such new cards can also emerge through post-hoc reflection on the actual session. As our example above shows, designers often need to fluidly change their initial plans and respond to the situation in-situ. In these cases, new cards can describe an emergent technique or tool, or a characteristic of the child that became apparent, or a contextual feature that shifted the process. All these cards are fed back into the five pools of cards which form the basis for subsequent planning. Importantly, this includes cards that describe the outcomes of the session, e.g., ideas and concepts generated.

The planning tool in use

We now retrospectively apply the tool to the planning of the session we described above, and demonstrate how it would

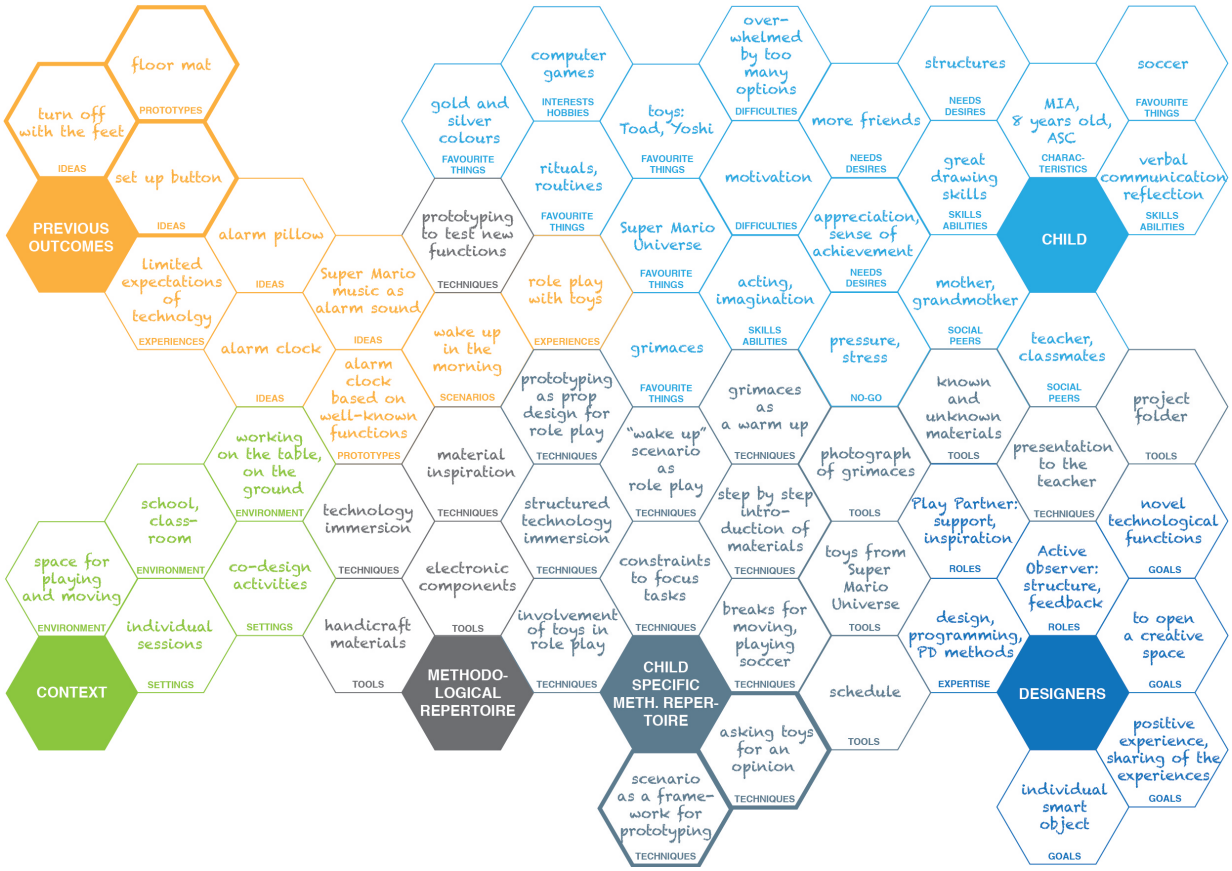

Figure 4. Applying the visual tool to design a session with Mia

have allowed us to systematically develop the next session - figure 4.

An initial set of cards describes aspects from each of the five perspectives. These cards have been created during the collaboration with the child, for example informed by the contextual enquiry phase in the beginning of the work. At this point in the process, we already have a wealth of cards describing Mia, her interests, her no-go's and characteristics. We also can build on previous outcomes, such as the card board prototypes and the basic concept of an alarm system. The child specific methodological repertoire is already populated with techniques that have been previously effective for engaging Mia, for example the warm-up routine and the role-play scenario. Context and the designers' perspectives have remained stable over the course of the collaboration.

The initial selection of techniques and tools is guided by our overall goal for the 10th session of opening a creative space for novel technological functions. From our general methodological repertoire, we chose the techniques of *technology immersion* and *material inspiration* as well as different tools like *electronic components* and *handicraft materials*.

Interpreting generic techniques and tools for this session leads to the creation of new, child specific techniques, e.g., structured technology immersion or prototyping as a prop for role play. These are developed considering the larger network of considerations from the four remaining perspectives: the child, previous outcomes, context and designers. For example, structured technology immersion considered that Mia required time and structure to be introduced to new materials, particularly if they offered many options. Some of that structure comes from previous outcomes and experiences in the design process. Additional structural support comes from the well-known roles the designers play and the usual physical setting in which the session is conducted. We also tailor the selected tools to specific requirements to reduce potential confusion. For example, we balance novel with well-known handicraft materials and include her favourite colours.

We blend prototyping with role-play and Mia's preference for acting out scenarios. Prototypes then become props for role play, constituting a new, child-specific technique. We embed newly introduced materials in the wake-up scenario, with already ritualised role play activities to quickly test the prototypes created. We supplement Mia's need for structure through well-known components, such as the visual schedule and the presentation of outcomes to the teacher after the session.

After the session we replenish the sets of cards with new ones describing outcomes and child specific techniques and tools, e.g. the concept of a floor mat to switch the alarm off and the ideas around setting an alarm with a single button. While not planned, two child specific techniques emerge upon reflection:

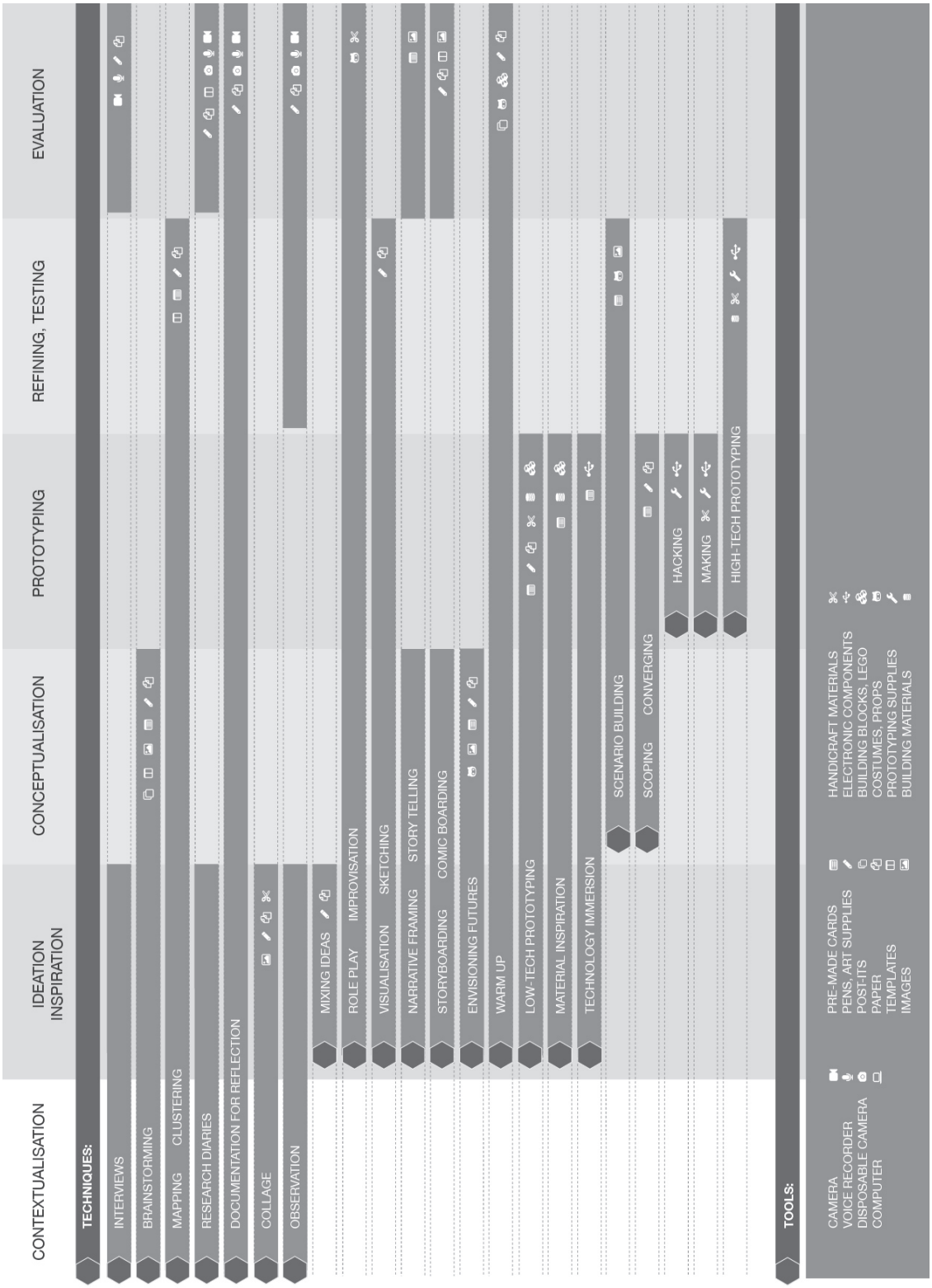

Figure 5. Tools and Techniques in OutsideTheBox

Firstly, *to ask Mia's toys for an opinion* is a technique that could be useful in situations in which direct questions will socially overwhelm her. Secondly, using the *"wake up" scenario as a narrative frame for creating prototypes*, rather than for testing prototypes became a powerful technique to give Mia more inherent motivation to build things.

REPERTOIRE OF BUILDING BLOCKS

The above detailed the design case of Mia and exemplified the use of our visual tool for planning sessions. Looking across *all* our collaborations, we have identified a wider range of building blocks that formed our overall repertoire of tools and techniques in OutsideTheBox. Figure 5 presents these, organised along their intended use time in the design process: contextualisation, ideation & inspiration, conceptualisation, prototyping, refining & testing, and evaluation.

We deliberately use the same terminology as Sanders et al. [23] to distinguish between approaches, methods, techniques and tools. While approaches reflect broad strategies, methods are structured activities which may be comprised of different techniques that are purposefully combined and supported by tools. Other than our collection of building blocks, the framework by Sanders et al. proposed to categorise techniques along their intended purpose to distinguish between probing, priming, understanding and generating. While these categories also resonate with our building blocks, we have found many techniques working across them. Hence, we decided to organise them along the time they have been used in the design process.

The techniques included here are components of other methods that appear in various forms in existing literature, for example, in Fictional Inquiry [7], Co-operative Inquiry [8] or Contextual Mapping [29]. Others are general techniques, widespread in design, such as brainstorming, interviews or collages. They all are conceptually not fully fledged PD methods in their own right, but can be purposefully combined to make up activities that form a coherent method.

Our methods are supported by a multitude of tools. The variety reflects not only the diverse expertise and background of the research team, but also the diversity of needs and abilities of the children we work with. As such, their visualisation represents the physical suitcase full with prototyping materials, electrical components and other tools (some of which are depicted in Figure 5), we bring to every session. Having such a large fund of tools available during the sessions enables us to be flexible according to a child's specific needs in a specific moment.

Techniques and tools combined represent the building blocks we blended and combined at various stages in our design process. The range of techniques presented here, thus, reflects the particular work we do - participatory design with autistic children. They also serve as a snapshot of our current repertoire. Visualising the techniques and tools we have used so far also lets us reflect on our choices and provides options for expansion. When encountering a child with needs and abilities not yet reflected in our repertoire, we can expand it appropriately. In that, the visualisation comprises a summary of the diverse range of needs and abilities researchers and children bring together in OutsideTheBox.

CONCLUSION

In this paper we have argued for making methodological choices and appropriations in participatory design processes more transparent. While others have repeatedly made the case that PD methods are not meant to be off-the-shelf components [23], the process of choosing, re-interpreting, adapting and blending techniques and tools is often left un-reported. To fill this gap, we have proposed a visual tool for designers to plan PD activities and sessions. It is informed by a critical reflection on our own practises in designing smart objects with autistic children, where we found ourselves fluidly tapping into a repertoire of techniques and tools to develop a series of PD activities that were tailored to the child, the context and our own expertise. Importantly, we also found ourselves flexibly responding to the outcomes of previous sessions which significantly shaped the planning of the next activity.

To reflect this process and to increase the transparency of the judgements involved, our visual tool takes the form of a board game on which designers can combine cards from the different perspectives we identified above. It allows designers to systematically plan PD activities and become aware of the multi-faceted considerations that are required. It also makes designers aware of their continuously growing repertoire of methodological building blocks they can tap into. We demonstrate how this tool might work by retrospectively applying it to the planning of a session in our design case.

We argue such a tool has the potential to make contributions in at least three ways: firstly in facilitating the planning, but also the constructive reflection on design processes. Secondly, it provides a systematic and transparent means to document processes and finally, it can facilitate the communication within and outside the design team.

Taking a step back, we also sought to identify the building blocks of our own repertoire within this project. These building blocks are *not* full fledged methods, but techniques and tools that are meant to be combined and blended to lead to a coherent and situated participatory approach. While the selection we present is limited in scope, we argue that it can nevertheless be useful for others in search for their own repertoire of methodological building blocks.

As with the selection of tools and techniques, the arguments in this paper are made from within the context of participatory design with autistic children. However, we argue that they hold true for a wide range of participatory work, which will benefit from increased transparency in the development of their methodological approach.

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