The Magic Machine Workshops

Making Personal Design Knowledge

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Figure 1: Early example of a magic machine: The Singing Translator from Transmediale 2009.

ABSTRACT

New technologies emerge into an increasingly complex everyday life. How can we engage users further into material practices that explore ideas and notions of these new things? This paper proposes a set of qualities for short, intense, workshop-like experiences, created to generate strong individual commitments, and expose underlying personal desires as drivers for ideas. By making use of open-ended making to engage participants in the imagination of new things, we aim to allow a broad range of knowledge to materialise, focused on the making of work that is about technology, rather than of technology.

CCS CONCEPTS

• **Human-centered computing** → **Participatory design**; *HCI theory, concepts and models*; *Interaction design theory, concepts and paradigms.*

KEYWORDS

Design Research, Material Practise, Making, Magic.

1 INTRODUCTION

The HCI and design community makes frequent use of workshops to gather input for design and research processes. As

technology becomes more complex and ubiquitous, we believe it becomes increasingly important to open up the design process of new technological things.

However, workshop formats tend to look to the outcomes and participants as resources for design and research projects. This is limiting in a number of ways: It overlooks the potential of personal and individual visions and takeaways for the participants themselves, it narrows the scope of what can be addressed within the workshop process – in turn limiting the potential of the outcomes, and finally it controls the extent to which participants can take control of and reframe the focus of the overall research inquiry beyond the context of the workshop itself.

This paper describes a workshop technique, which has evolved over time to leverage artistic tradition and workshopping experience for the benefit of supporting the generation of deeply personal material by participants. This inverts the norms of existing design workshops in that it is not aimed solely at providing data for research projects, or groups of imagined users, but rather targets the participant to develop radically personal visions of a potential novel technological thing. While these visions may serve to build personal and critical positions by the individual participants, the benefit for the facilitators lies in enabling a greater diversity in the creative outcomes, vision, and sharing within the group

process. This gives us the opportunity to arrive at more complex understandings of a selection of diverse and diverging visions, rather than outcomes that aim to reach consensus and conclusions to solving a shared pre-defined problem. Further, by radically enabling the individual and personal visions of participants, we accelerate the boundary testing and subsequent expansion of the shared design space, while developing critical competences for participants that can be meaningful beyond the particular workshop experience.

In order to achieve this, we attempt to overcome issues of technical competence and know-how by operating materially in the hypothetical: We engage with technological things as what we call 'magic machines', while addressing design skills and competences through mundane materials and strict timing. We use a general subject-specific prompt to provide a focus for the exercise, but the outcomes themselves are based on personal concerns, that are in turn elicited and shaped by the workshop techniques and structures.

Our contribution here is a specific approach to workshops that serves the uncommon stakeholder and generates complex individual outcomes, and as such it attempts to shift the unstated balance of power in the direction of the individual workshop participant. This is not to create an opposition between individual and collective, but rather to shift the balance of attention from the aim of designers to the less teleologically driven, differentiated, and more complex aims of single participants. Our contribution is the methodological example of the 'magic machine workshop', specifically the workshops' strategies and techniques, and how it encourages a different outcome-space focused on the participants' creativity rather than a collective design team goal. By deliberately engaging with the personal and the extra-ordinary, we aim to open up the potential scope for user engagement. We suggest a re-focus on three areas of workshopping that works to increase degrees of participation and complexity of output from workshop sessions: language, material and timing. We propose that further attention to these aspects generates positive outcomes for both the workshop process itself and the way we engage with participants in design research.

2 RELATED WORKSHOPS

Workshops have had a long and critical role in HCI as a method to engage participants in new designs or research opportunities, allowing researchers to investigate a range of designs and user concerns from creativity [44], user participation in the design process [25, 33], user experiences [13, 16, 20] to embodiment [36, 40, 57] to name but a few motivations. Our approach draws on these traditions, but our efforts are directed at further rethinking workshops in terms

of their relationships to materiality, performance, and shifting the goal of the workshops themselves towards benefiting participants rather than designers and researchers.

We draw on the design field's use of traditional creativity techniques from the arts, such as Cage's methods of chance [17], Shklov-sky's obstruction [54] and the improvisation work of Boal [11]. In the field of theatre, collaboration with audiences has a long history, such as the above mentioned Boal, who asks the audience members to be agents of change in order to engage in the re-versioning of a play [12]. This type of open participatory performances are brought back into focus by Ranciere in his book 'The Emancipated Spectator', in which he calls for a "theatre without spectators, where those in attendance learn from as opposed to being seduced by images; where they become active participants as opposed to passive voyeurs" [46]. This of course bears direct relations to body-storming [45] and role-playing [26] approaches in HCI, and we remain informed by the techniques of audience engagement from these traditions as well as more traditional notions of performance.

Relatedly, design approaches to participant engagement have utilised artistic approaches to create illusionary or imaginative spaces from which collective design work may occur. For example, design probes [28] generate design input inspired by surrealist games [15] and Fluxus [27]. The design games proposed by Ehn facilitate experimenting with possible configurations of systems through props and rules [25]. While the tactics of Placebo Design [23] inspire participants to address problems without solving them [43]. Recently, Vines et al proposed the use of 'questionable concepts', where sets of deliberately flawed design solutions, such as an exploding handbag to deter thieves, are introduced into workshop sessions as a kind of prop, to facilitate critique and discussion [55]. Bowers et all explore the possibilities of working playfully and creatively with diverse communities to develop practical strategies for managing complex projects and practises [14]. While Gerber stays closer to the theatrical tradition in her exploration of how techniques of improvisation can be adopted in design, by focusing on three instructions: be obvious; accept invitations; and fail cheerfully [30]. We equally look for ways to engage participants through critically imaginative conceits, yet our aim is not primarily to be inspired, to co-design, or to address issues; but rather to engage participants in novel and personal ways to develop their own competences and radical visions for a more personal use of creativity and relations to technologies.

In this respect, our approach is analogous to other reconsiderations of the workshop method, including Ratto's reconfigurations of material, user, and prototyping as critical making [47], Rosner et al's use of workshops themselves as a research method [48], or Wilde et al's work on extending the

relations between embodiment, materiality and performativity [57]. Our approach is different in its concerns, but shares the motivation to rethink the workshop method anew, exploring what other assembly of practices and engagements it might hold, and in our case, how the emphasis can be shifted to the benefit and development of the workshop participants.

3 A PERSONAL FOCUS

The workshop process outlined here, is deeply and meaningfully indebted to existing techniques and strategies; it makes use of the speed and playfulness of brainstorms [44], the physicality of embodied design [57], the art strategies of placebo design [23], the openness of the cultural probes [28], and the radial thinking of speculative design [24], critical design [9] and critical making [34]. However our central aim diverges from these by focusing primarily on the experience of the individual participant as the central point of reference, in the belief that by engaging divergent and diverse viewpoints, we will gain more complex understandings of the subject at hand, even if they do not necessarily provide us with the answers we expected or wished for.

We do not present the magic machine in opposition to existing workshops, rather the format should be seen as a companion to these strategies and our attempts at condensing our insights into executable steps, as a effort to broaden the use of such methods and concerns.

We are specifically dedicated to bringing the openness of improvisation and performance into a material making process, that allows the creation of speculative and hypothetical things, which may then function as anchoring points for conversation and discovery. As such, the approach and sensibilities are deeply informed by the methods outlined above, and take their starting point in a shared acknowledgement of the importance of creative obstructions, playfulness and embodied thought.

The magic machine workshops are focused on engendering strong commitments and allowing a broad range of knowledge to materialise. At the core, is a dual process of making explorative things and interpreting these in a structured manner. Where the making is introverted and personal, encouraged by prompts, material and timing, and the interpretation is supported by the shift to an extroverted performative experience. The aim is to support both these acts in order to generate outcomes with a specific set of qualities: magic machines. These outcomes are magic in the sense that they are extraordinary, surprising and novel, they are machines in the sense that they are man-made devices and finally they are magic machines in the sense that they suggest objects of extraordinary ability that reflect ephemeral and personal concerns.

These speculative things do not just represent technology stand-ins and paper prototypes for potential new developments, instead they critique and question our use of and relations to technologies and allow participants to bring forward personal visions and concerns. As a result, they provide a focus on both process and outcome, and reflects back onto the setup of each design enquiry.

4 MAKING A MAGIC MACHINE

The magic machine workshops started from desire to make workshopping more engaging to a broader audience; and to elicit nuanced and imaginative responses that challenge and stretch what we consider possible. The first versions of these workshops were developed for the art festivals Amber 2007 and Transmediale 2009 [3] [see figure 1], but they have been used in a variety of projects addressing a range of subjects since, from urban development to novel interfaces for music [4–7, 10, 32, 41].
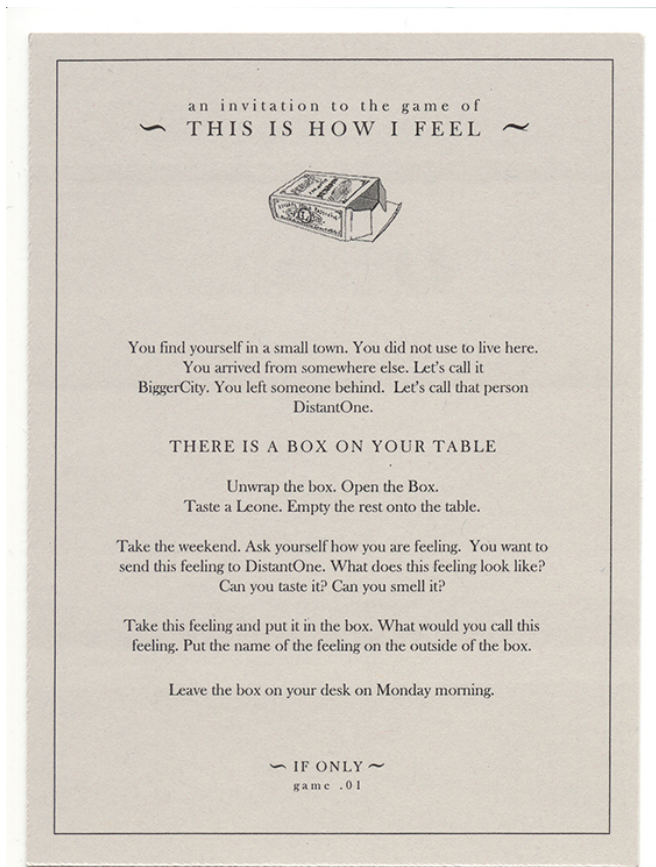
While the format is modified from workshop to workshop to account for context, theme and situation, the core structure has become stable over time and can be distilled into the following steps: Introduction, prompt, material making, being done, description, group discussion, and documentation. These steps were first identified by Andersen and Wilde [8] and are presented here in an expanded and revised form.

In this paper we will, for ease of reading, focus on material from a hypothetical-instrument-building version of the workshop, executed in Edinburgh as a part of the sIREN 2017 festival. This instance of the workshop was conducted with eight professional musicians as participants. They were asked to draw a sound they would like to be able to make on a small piece of paper; and then to build a machine that would make that sound out of the limited selection of available materials. The materials available were paper plates, paper and plastic cups, plastic cutlery, string and cardboard. The workshop took two hours, and afterwards participants were emailed a set of questions. Throughout this paper, we will share quotes from the answers from that email exchange.

5 KEY WORKSHOP ELEMENTS

In the following, we will describe each workshop element in detail, while we pay particular attention to the underlying concerns, references or experiences that inform each element in turn:

- Introduction
- Prompt
- Material making
- Being done
- Description
- Group discussion
- Documentation

Figure 2: Early examples of prompt card and workshop scripts

Introduction

The facilitators introduces the workshop session.

The facilitator welcomes the participants and introduces the workshop. The introduction is purposively short and practical aiming to mark the beginning of an experience that is out of the ordinary in a manner similar to a game: In a theatrical sense, it declares that something playful is beginning and that the workshop will be governed by formal rules like a game [18]. As such, it provides the first step towards a social contract within the group and sets the scene for a trust relationship between the facilitator and the participants in the workshops.

The very first versions of the introduction appeared in earlier projects as invitation cards for the FARAWAY project [6], and as scripts for the whisper project workshops [53] [see figure 2]. Careful attention is taken to make sure that the introduction uses ordinary language and is inviting; yet short and determined in its wording.

Over time the introduction has become shorter, its main quality is to close the deal on the social contract, take responsibility as facilitator for what is about to unfold and then move very quickly on to the next step, the prompt.

Prompt

The participants are provided with a prompt. This can be a selection of words or things from which they are asked to pick one, or a very quick task to draw, imagine a situation or write a short note.

The prompt has two important functions. First, it situates the work in a particular thematic context: In the OWL project [8], the combination of picking a desire and identifying a place on the body, primed participants towards the making of something wearable. In the anti-solutionist workshop [10] the definition of a personal fear of ageing focuses the participants towards empathy and personal commitment towards this user group, and finally in the various instrument building workshops the drawing of a sound shortcuts the

Figure 3: Drawing the sound that you want to make on the palm of your hand.

Figure 4: Building the machine from challenging materials, selected to provide obstruction.

genre definitions, and provides a shorthand for the complex questions around artistic goals.

Secondly and equally important, the prompt provides us with what the artists from Blast Theory would call a red spot experience [2]. The red spot is an initial goal in an interactive piece that tests competence and establishes confidence, acting as an on-ramp to an experience. By setting a clear, achievable goal, it allows participants to begin a positive feedback loop or, if they falter, to signal the need for additional support. It also makes it easier to step to the next stage of the experience since the first creative decision has already been made, and the haste in which this commitment was made makes it easier to do.

> "In a way the drawing was what surprised me. I improvised it and then the sculpture is merely a translation of the drawing." Participant M

The prompt provides a fast, and seemingly random task that frames the subject of what we are about to do, whilst being very easy to execute. For example, to ask a musician to draw the sound they are looking for with permanent marker on their own hand, is a serious and absurd request. It is both impossible to imagine (you might not actively know what you want) and impossible to execute (the drawing of sound) and the tools themselves (hand and permanent marker) are boundary crossing. In this way, they work together as a surrealist challenge [15]: Do something difficult and do it in a difficult way. The traditional interpretation of such a surrealist challenge is that these two possibilities somehow cancel each other out and will ultimately form an executable task [see figure 3].

Material making

The participants are asked to use the available materials to build the 'machine' that addresses the prompt.

This is a difficult task, the content of the prompt must be translated into an imagination of the device that produces it, and the participants are provided with a very specific selection of materials with which to execute it [see figure 4]. Over time, the selection of materials provided has been pared down from a wide range of structural possibilities, to a much more limited and strongly curated selection [see figure 9].

The shift from prompt to making appear to be encouraged and informed by the particularity of the material selection.

> "A tension immediately arose in trying to reflect the sound image of my drawing through these materials, which took on a certain life of their own. My drawing pulled in one direction, while the materials pushed back." Participant C

In the OWL project [8], we provided a broad selection of recycled materials, while making sure that they would all be white or natural looking (such as wood, metal, cardboard etc.). We wanted to encourage a situation where the function and capabilities of each proposed outcome were expressed in the composed form itself. This echoes the classic form follows function stance from Modernist architecture, where the use of additional ornament is avoided. In the case of technology design, it stands as an alternative to the addition of technological functionality of an already established design form. Here, it is done to encourage creativity and crafting, as an attempt to counteract the natural tendency of adding a black box technological concept to an existing form.

> "In building my model, I was surprised how important the materials were for me. I can't explain how/why I gravitated to certain materials and not others, but once I had selected things to work with, their implicit potential directed my construction." Participant C

Each project theme and group of participants come to the workshop experiences with an established notion of 'how we do things'. For this reason, the design of each workshop experience involves careful consideration of what these prior assumptions might be, and how they may be creatively obstructed. The material choices represent a chance to push against such preconceptions; in order to reach beyond the well-worn and already considered types of outcomes. In other words, by making it very hard to construct boxes, screens and buttons, participants are encouraged to consider other ways to express interfaces to their 'machine'. Since there is no technological material present (in the form of prototyping boards etc.), the technological concept becomes focused on what it does rather than trying to execute a novel set of

functionalities from a well-known, existing, technological paradigm.

> "It was surprising in the sense that I didn't quite know what I was making; the thing was created as I went along." Participant A

A repeated observation is that there is often next to no conversations about the machine being built, each participant shares space and tools, but essentially works individually in a focused manner, and this continues throughout this section of the workshop. This is an emergent, observed pattern of behavior, signaling perhaps that the creative challenge, the fragility of the ideas and the difficulty of the material, conspires to temporarily mute both the internal monologue of justification and the desire to explain and narrate the process to others.

Being done

The facilitator waits for the moment when a majority of participants are done.

Another consistent observation is that there is a clear moment of being done. This appears to be an instinctual knowing, and it is very apparent to the facilitator. The making process is practical and immediate [52], and it is up to the participants themselves to know and signal when they are finished building [see figure 5]. This appears similar to the process of musical improvisation, where the musician not only knows when [49], but also intuits (in what appears as wordless communication with both fellow musicians and the audience) when a segment or piece is 'done'.

Considering that the participants are building something with very limited instructions, and a period of pre-consideration that is concluded in less than ten minutes, the emergent moment of being done is a surprising factor in each workshop.

> "I don't feel like my idea or model found its final form even now. I do however feel that there are intermediate points at which it is good to stop, which seem to coincide with having used up or matched the ideas and thoughts in their then current form (if that makes any sense)."
> Participant A

One way to look at this is to connect it to the skill of pattern recognition. We would like to propose that the feeling of being done may be related to the moment the maker looks at the self-built thing, and recognizes it as 'a something'. The making process itself tends to be made up of periods of detailed and focused attention on the skills and materials available, to for example attach a piece of cardboard to another piece of cardboard, and these periods are interspersed with moments of observation and consideration, where the work-in-progress is considered as a whole, and the maker may ask: Am I done? Does this object ask for more work?

Figure 5: Finding the use of the machine through engaging with its form.

In the recognition of the emergent object as a whole thing rather than a collection of material fragments, the maker may be able to declare him, or herself, done.

> "It found its final form once I had finished attaching all parts that I had imagined adding. Somehow this seemed to occur around the same time as other participants." Participant L

Description

Participants are then asked to present their 'machine' to the rest of the group as a performance or demonstration.

Once the group has finished building the prototypes, the facilitator picks a participant and issues an invitation: "Please, stand up, tell us the name of the machine, and show us how it works" [see figure 6]. This move has not been announced before, and participants are often taken by surprise. In effect, the participants are asked to use their self-built machines as props, to improvise an associated cognitive walk-through, thinking aloud, while executing a task as in a usability test [42, 56]. In many ways, this is similar to the usability strategies of 'paper-prototypes' [51] or 'Wizard of

Oz' [21, 38], where this type of inquiry could be used to investigate work-flow strategies and potential cognitive and conceptual shortcomings in a proposed interface or set up. In this context, it is framed as a performative moment, or alternatively in the case of non-performers, as an elevator pitch.

The energy shift inherent in changing from an internal wordless making process to an external performative presentation, is significant and often perceived as high risk. It generates a high level of focus and attention, similar to Ryan's description of musical performance: "the performance itself becomes the test bed, where the unexpected curves into your plans and you are forced to reconsider everything" [49].

This shift of attention from contemplation to pitching, is made even more urgent by the requirement to name the self-made object. This is a well-established performative strategy in music and theatre improvisation, and even in design brainstorms. It creates a situation in which the participant is required to rehearse [26] the use of the machine whilst describing it. By creating a situation, where we are suddenly forced to verbalize the outcome of the making process, we are essentially creating a moment of verbal improvisation. By controlling and excluding language from the central making part of the workshop, an intuitive and improvised spoken-word event emerges, creating a set of post-hoc rationalizations and reasoning, driven by an on-the-spot interpretation of the self-built machine.

> "I felt as if I had built something that I had been already thinking about for a while."
> Participant L

We would like to argue that a considerable amount of embodied knowledge and insights have already been gathered during the making process. The presentation forms an opportunity for the participants to name and identify some of these, in effect translate them into language and begin to reason about them. By postponing the moment, where we talk about the new object, until after it has taken some kind of temporary, physical form, we attempt to circumvent habitual internal monologues, which might in effect mirror the habitual movement patterns described by Höök [35]. To break away from such patterns requires effort and mental strain. It could be argued that the entire workshop format is set up in order to ease and facilitate this work. The turn towards language can be seen as an opportunity to collapse embodied, emotional and intellectual reasoning into one tentative set of words delivered in a live improvised presentation.

Figure 6: Demonstrating the finished machine.

Group discussion

Each presentation is discussed and questioned with the group.

After each presentation, the facilitator and the group ask questions, in the manner of a traditional design studio critique [50]. This conversation approaches the machine as a given: it is, whatever the participant says it is. The facilitator aims to avoid evaluation, meta-commentary and irony, aiming instead to facilitate a deepening of the concept, and if possible, a clarification of its scope. This is done with the following questions in mind: Which modes of interaction are present? Is it reminiscent of existing things? Can it be evaluated in terms of plausibility, intimacy, scale and range? Is the proposed functionality emerging from, or in contrast to, its physical form? Does it offer affordances that open up new avenues for explorations?

> "I honestly didn't understand my object at all until you and others started commenting on it."
> Participant C

These questions are deliberately technical in nature, in fact they are similar to the sorts of questions one might ask of any design proposal. By shifting straight into a serious and technical discussion, the participants are encouraged to look at their own prototype with a different perspective: If we assume for a moment that this thing is a viable functioning technological machine, what are the exact edges of its functionality? How is it turned on and off? What material is it made from? And if this can exist, what other things might be possible?

> "I would describe my object as a sort of music box. This wasn't what I set out to do, but I came to realise that, this is what it is, afterwards."
> Participant A

The machine itself is created out of a quick intuition or a concern, which is then addressed through its own 'thingness'
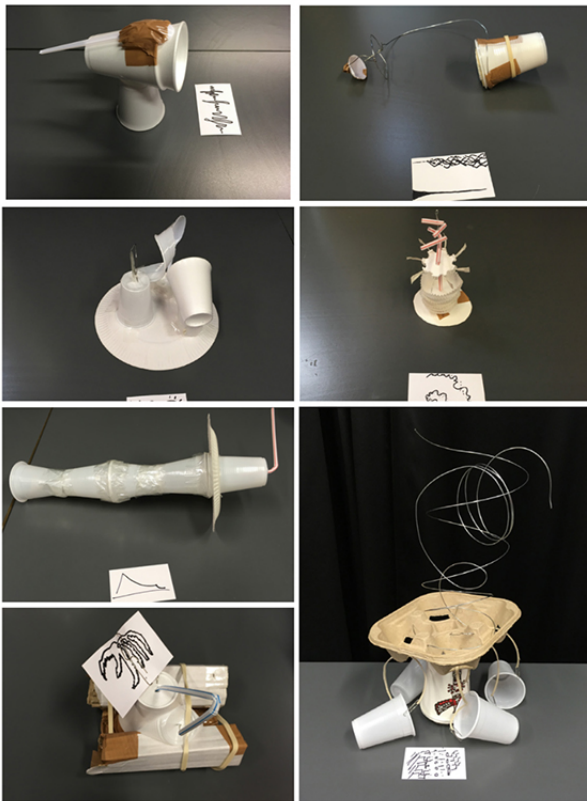
Figure 7: A selection of music related magic machines alongside a drawn prompt.

and ultimately its intrinsic existence as a material object. In other words, a particular line of inquiry is investigated through the making and activating of each experimental and explorative machine. These can then be evaluated and addressed within an essentially theatrical experience: as if they are what they say they are.

This final conversation allows the description of the machine to develop, and as this happens, we pay attention to the process as it unfolds [37]. In this way, new ideas and words are brought into the workshop context, and these words are now available for both participants and facilitator to address, and speak about the original concern [see figure 7]. This constitutes an important outcome of the process.

Documentation
Each machine is photographed and documented.

At this point, the workshop has officially finished, and the mood changes and becomes more informal. Participants are invited to pose for a photo with their machine, one by one. Each photo is self-staged, with the participant deciding how to best illustrate their thing and finally approving each shot [see figure 8].

Figure 8: Self portraits with machines

Documentation is an ongoing challenge, it is important to find non-intrusive ways to document and capture the often very fragile moments and insights. The main requirement here is that the making of data cannot be allowed to break the flow of the workshop experience itself. By inviting the participants to essentially self-document their prototypes at the end of the workshop, we underscore the fact that they control the form and aesthetics of the photos, in their role as co-creators and makers, rather than observed users.

6 DISCUSSION: EMERGING CONCERNS

The workshop format reported here, can be seen as an attempt to facilitate a lived experience of engaging directly with an essentially imaginary thing. The participants build tentative and hypothetical things as non-functional machines out of everyday materials, and each outcome reveals insights and concerns, but just as importantly, the process temporarily frees them and us from considering practical and technical limitations for design.

> "What surprised me most was the retrospective recognition that the device effectively models existing non-linearities in my own hearing."
> Participant S

These self-built machines are often informed by serious concerns and personal experiences as in the example above;

but built from materials often chosen for their 'trickiness' and lack of permanence. The result is a physical entity, a prop that temporarily embodies a continuity error: It should not be here. It is as out of context and alien as a ballpoint pen, carelessly left behind in a period-drama shoot. While it is here, it allows us to engage with its potentiality, to mark the space around it [39], and to rehearse living with its tentative context [26].

Each machine is temporary and serves only as a stepping stone toward the next one, the thing in itself loses value as soon as the following step has been made. But, as each participant stands up and handles the machine, it makes itself available to them in a temporary performative space, as they consider what it is, and how it may embody the unknown. As such it functions as a powerful critical tool for personal reflection on technology considerations and alternatives. In this way, the workshops provide an opportunity to make use of creative and counter-intuitive approaches that allow participants to critically rethink their relationship with technologies.

Language

Over time, the language used in the workshops have been modified and adjusted. In the early workshops, we used words such as technology, future and design. We eventually found that such phrasing limited participants in a number of ways. Firstly, in specifying the subject at hand as technology, participants responded by limiting themselves to techniques they considered 'technological'. This overlooked social and creative techniques and resulted in ideas related to and feasible with the current technologies available.

Equally, the word future evoked visions of cinematic science fiction that overly focused on cultural tropes [43] such as food-pills, robot-butlers, jet-packs or brains-in-vats. Whilst entertaining, these ideas are well rehearsed in popular culture, and so rarely bring forth new insights.

The word design put too much pressure on the participants to come up with a 'good idea'. A design vision tends to imply a strong concept; a neat execution; and ultimately, an idea that will be 'the next big thing'. This tended to put participants under strain to perform, and prolonged the hesitation period before building and making.

In contrast, the word magic is used deliberately, counteracting the constraints of words like technology, future, and design, by injecting the notions of the powerful and unknown. This approach is similar to that of Auger and Loizeau in their analysis of the robot as a societal and cultural reflection on our dreams and aspirations: "The robot can reflect the current state of technological development, our hopes for that technology and also our fears" [1].

By substituting the word technology with magic and machine, we are opening up the query to reach beyond the

Figure 9: Curated material selection

adjacent possible to our current technologies, with magic referring strongly back to Arthur C. Clarke understanding of technology [19]. Magic, in our use in the workshops, refers to the desired, but not-yet-understood abilities of future technologies and machines.

Equally, the word machine evokes something very broad and mechanical/physical, providing participants with a place-holder for a thing that does 'something'. Corbusier famously described buildings as machines for living, and following this example, we can imagine a very wide selection of human constructions and designs as machines. The word again echoes Auger and Loizeau in the description of the robot above: the machine is a human-made technological device, evoking both fear and longing as we project it into the future and come up with uses for it.

Material concerns

We might regard the materials used in the workshops in a similar way. Through their specificity and occasional quirkiness [see figure 10] they form part of the broadening of possibilities needed to start each workshop. If you are challenged to do something difficult AND to do it in a difficult manner, sometimes the outcome can be that these two sets of difficulties work together to effectively facilitate the execution of the task, as known from Surrealist games [15]. In other words, by making it very hard to construct their machines in any traditional fashion, participants are encouraged to consider other ways to express the form and function. As a result, the technological concept becomes focused on what it does rather than trying to execute a novel set of functionalities from a well known, existing, technological paradigm.

By carefully curating the materials we work with, we create slightly different artistic obstructions, as appropriate

for each project and participant group. Each material will have a tendency to pull the outcomes towards a particular direction. By providing limited and quirky materials, we are exaggerating this effect to such a degree that the resulting participant-made thing must be created against the pull of a given material. The idea itself must have enough force to emerge despite the material limitations.

The choice of material is modified for every group, while mostly based on cheap disposables, food stuffs and office stationary, we strive to provide as much of a creative challenge as possible within these material choices. As an example, music professionals are never offered materials with acoustic properties, such as boxes, elastic bands or wood. By having to create the notion of music from the form as it emerges, we are liberated from the easy explorations of the material at hand.

Again, this frees up the participant: Since the materials act as a forceful obstruction, the pressure to skilfully produce something beautiful and well-crafted is lessened, and it becomes harder to tell the difference between an experienced maker and a novice.

> "I blame the supplier of the materials."
> Participant C

This provides participants with a creative and liminal space in which to work. They are asked to respond to difficult creative tasks, and they are made to execute them quickly with sub-optimal materials and tools. Instead of making the experience harder, this appears to free up a certain playfulness (as illustrated by the participant quotes above and below).

> "We are both taking it very seriously and at the same time, not seriously at all."
> Participant M

The outcomes from the workshops can be seen as props that allow participants to fantasise and guess about their functionality and use. Certain features will be accidental. These are dictated by the materials available and the short time in which it was built, but these features (intended and unintended) tend to come together and work together, when participants give their presentation of their machine. During the performative moment of the presentation, with the heightened alertness of the participant, the machine itself instructs us, as to how it should be handled and used.

Time elapsed, time remaining

Throughout the process, a high pace is maintained. Ten minutes into the start of the workshop, the first two steps should be completed, and the third initiated. The third step – making – takes thirty to forty five minutes depending on the group. The step is complete when the machines are deemed to be done. The presentation and discussion stages (four and

Figure 10: A selection of magic machines created by teenagers from candy.

five) are dependent on the number of machines that are to be discussed, and the entire workshop generally concludes around the one- to two-hour mark.

The tight schedule emerged from the experience that to spend longer time searching for an idea does not necessarily make the outcomes better. Instead the high pace works to again liberate the participants from the potential of failure. The fact that the materials are often hard and even ridiculous [see figure 10] and there is very little time to design, means that no one will feel that the outcomes are not 'good enough' and this lends creative freedom to the experience.

The workshop is effectively used as a temporary space, and the role of the facilitator is not only to safeguard that space, but to make use of the workshop techniques to actively create it. It is the safety of the space that ultimately allows the risk taking and experimental nature of the work. The practical ethical duties of the facilitator go beyond taking care of concerns like consent; it extends from the taking care that no one will feel 'on the spot' to taking responsibility for the way the work is initiated, made, handled, recorded, and photographed.

7 MAKING DESIGN KNOWLEDGE

What is the nature of the design knowledge generated here? The process is focused on redistributing and re-framing a given design research inquiry, with the aim not to solve and control a problem, but rather to address and suggest individual personal strategies for coping with a concern. The outcomes are driven by both properties and form, with a strong constant being the embodied experience of and interaction with an extraordinary thing. While the ultimate results are expressed in conversation and language, the main component of the process should be understood in the sense of Dewey's experience [22], where we work with ideas, not just in the form of description, where only language can become knowledge and meaning, but rather as a process of becoming that allow us to create patterns through embodied experiences. We would like to suggest that the design research in this context lies in the generation of the self-build machine, which then becomes the basis for personal expression and discourse, allowing meaning to be ascertained after the fact of its physical creation.

For design, this provides an opportunity to create knowledge that does not borrow its structure and representation from other fields. Rather insights are drawn from within, and are intrinsically of design things, in the sense that the things themselves, their materiality and imagery contributes knowledge that can be written about and described, but which does not necessarily originate solely from language and discourse. As such, the central concern of the workshops is to make first, by wordlessly going about the construction of things that then appear to suddenly emerge from the process. After this emergence, we can talk about them, argue and debate, probe and prod - until we know what they might be.

This encourages the individual participant to take a personal stake in the process and outcomes of the workshop. By allowing participants to frame and counter the initial framing of the workshop itself, we broaden the remit and scope for individual action. To us, this offers us the potential to make use of workshopping in entirely new ways, not just to test and explore a given design space or problem, but as an invitation to play with and re-frame the central concerns, bias, assumptions and each individual participants potential for agency and control of the narratives they participate in.

This individual participation is the source of design knowledge in our practice, but that same knowledge is primarily owned and governed by the individual and forms part of their evolving personal reflection, stance and position. As such, the exchange moves in both direction, we are allowed a glimpse into a very personal reckoning with potential technologies, and the participants take a step into their potential futures in a way that is artistically grounded and safeguarded.

Reflections

The technique proposed here is a step in the direction of paying closer attention to the way design researchers frame and choose the kind of workshops they use in their practice. While the outcomes are generated by participants, we also acknowledge that design researchers, as facilitators, always influence the outcomes. We, as design researchers, want things to turn out well, to be insightful. The materials we provide also push the outcomes in certain directions: the bottle-cap wants to be a button, and the box will fight to remain square. Like shopping trolleys with a bad wheel, they drag to the left or right. This is only a problem if we do not pay attention, if we do not see it. As William Gibson [31] writes: "We can't see our own culture very well, because we see with it."

In a similar manner, the workshops reflect back the questions we ask, the materials we provide, and the participants we invite. Instead of ignoring or trying to mitigate this cultural fault line, we try to make active use of it to create stronger and more explicit workshops, and to pay attention to the process as it unfolds across that fault line. Ultimately, the outcomes may then shift from being academic and designerly justifications to emerge as more of a complex and multifaceted materialist knowledge.

While art-related strategies are forming the initial conceptual framework of our workshops, in reviewing the outcomes, we recognise Cage's notion of chance in the serious-but-light making-process driven by quick decisions and making-do with limited resources, but equally in the performance of the incidental outcomes, executed with an essentially unwarranted seriousness and dedication. The Fluxus' desire to work with detritus and overlooked materials to create new compositions re-emerges in the making process, and as a whole, the entire workshop experience remains theatrical and performative in nature. As a result, participants generally make strong confident statements about their magic machines, expressing high levels of complexity of vision and stance that actively trouble and destabilises our research processes. The notion of magic, in the form of the sleight of hand, the curse, the untruth and the exaggeration, appears to provide an additional creatively hypothetical for participants.

While this technique can generate a certain kind of design material, it is limited in terms of what, it can do. The workshops are challenging to facilitate, the start of the workshops require strong commitment on the part of the participants, and it is hard to maintain a truly open structure of the live experience, as both facilitator and participants become invested in the outcomes. The insights can be intangible and hard to capture, and the act of turning them into outcomes can

sometimes be at odds with the open premise of the workshop experience itself.

These workshops are also not helpful in evaluating design proposals, and they are not methods of requirement engineering. Instead, they question underlying assumptions, shift elements of control back to participants, and evaluate the framework and vision of a given design query. As such, they give us the opportunity to check our assumptions and unconscious bias, while allowing participants to focus on and tackle subjects that they deem important, potentially allowing difficult and troublesome ideas to emerge.

8 CONCLUSIONS

The magic machine workshop is an addition to the existing family of methodologies, not meant to replace or critique user studies or requirement engineering. Instead, it is aimed at providing an additional opportunity to set the scene for an inquiry or concern.

In this very basic form, it is a two-hour experience, a co-acted performance or a game with a beginning and an end. At its base, lies a willing suspension of disbelief and the rapid construction of a temporary social agreement. Within this agreement, we may consider complex, difficult and naive things; and propose solutions that, while they may not solve anything as such, touch upon notions of dread or desire. This allows us to temporarily engage in subjects we might not otherwise address; subjects that are either too difficult, or too banal, to be addressed by the traditional design brief as we know it.

Rather than gather feedback or requirements, the magic machine expresses personal emotional content and notions through an embodied process of making. The main move here lies in the making of non-functional, but powerful machines, through a series of artistic distractions and obstructions. Strict timekeeping and obstructive material choices allow a converse freedom of expression and liberate participants from technological concerns and limitations. While the making takes a central position in the process, the self-made thing is not important in itself, but rather it forms the container through which a vision or idea might be relayed.

These differentiated outcomes constitute the immanent value of the individual magic machines. In a parallel to Gaver et al's notion of 'ambiguity as a resource for design' [29]; we propose that the multiplicity of highly personal and interpretive content might serve as an additional and complementary resource to design and HCI workshops, which can then in turn be analysed, annotated or simply challenge designers.

The results are visions of what-may-be, and as such they do not foreshadow the future, as much as they present an opportunity for the participants to reflect on their everyday lives through the imagination of impossible things.

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