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Mood Squeezer: Lightening up the Workplace through Playful and Lightweight Interactions

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ABSTRACT

Many companies would like to redesign their workspaces to make them more pleasant and even fun places to work in. An assumption is it will result in social and economic benefits. However, it can be difficult to achieve because of cost, level of disruption and regulations. We present an alternative approach that provides an injection of playfulness into 'drab' office buildings. A lightweight technology intervention was designed - Mood Squeezer - that asks people to reflect on their mood by squeezing a colored ball from a box set. The squeezes are mirrored back as an aggregate colorful visualization on a public floor display. An in-the-wild study showed how this intervention was successful at getting people to squeeze their mood, leading to a diversity of conversations throughout the building. We discuss how this lightweight approach to office augmentation can provide new opportunities for opening up a 'closed' workplace.

Author Keywords

Physical computing; Public visualization; Tangible interface; Mood; In the wild; Work; Playful technology

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

Office buildings are often designed to be utilitarian, with a focus on how to fill them to capacity with people, equipment and furniture. The result can be dull and uniform interiors. However, research shows that drab color schemes, poor lighting and insufficient natural light and ventilation

Figure 1. The view down a typical corridor in the workplace.

can have a negative impact on employee mood and morale [20, 19]. Many office workers remain seated at their desks for hours on end glued to their computer screens. This can be further exacerbated by a serious and busy work ethic where people tend to eat their lunch and drink their coffee at their desks. The tendency to stay put once at work, however, reduces opportunities for colleagues bumping into each other and having opportunistic conversations. Moreover, the impact of low social connectedness can lead to feelings of isolation and monotony [14].

How might these negative aspects of the work environment be reduced and replaced by a more positive work culture? One possibility is to design more imaginative interiors that encourage people to take time out to talk, play and socialize. For example, a few creative and tech industries have begun experimenting with fun, open workplaces where playfulness and interaction are encouraged. The assumed benefits are thought to be social and economic, leading to greater idea cross-pollination, collaboration and productivity. For many established organizations, however, such makeovers can be too costly or difficult to get approval for because of health and safety regulations. How else might existing workspaces be made more open?

Our approach is to capitalize on affordable technology interventions that are designed to be deliberately playful, and that aim to elicit more openness and conversations amongst colleagues who might not normally talk to one another. In this paper we present Mood Squeezer – a technology intervention intended to engage people in a lighthearted and playful way to reflect on their moods throughout the day and to talk to others about them.

Using the principles of playfulness, ambiguity and curiosity, we designed a series of input devices comprising a box of brightly colored, squeezy balls. They are intended to be attractive, luring people to do something lighthearted by literally squeezing the 'color of their mood'. The squeezes are then fed in real time into a corresponding colorful floor display in a public space for all to see. The rationale behind the design was to make people stop in their tracks and do something that would take just a few seconds but which they could reflect upon or talk about subsequently.

To test how an office community approached, reacted and appropriated such a playful technology interventon, an in-the-wild study was conducted over a number of weeks. The findings showed that squeezing balls in this lighthearted way encouraged self-reflection, openness and interaction between many colleagues and engendered more positive attitudes towards the workplace. The research presented here discusses in more detail the rationale for the design of the technology, the findings of the study and the pros and cons of using a lightweight playful approach of opening up office spaces in a lighthearted way.

RELATED WORK

Work and Play
Work has traditionally been viewed as a serious business with economies and livelihoods depending upon it. Playing and having fun in the office is viewed more as a distraction. However, this view is changing. While the "baby boomer" generation (born between 1941 and 1960) often regard fun as counter-productive, the new generation of "millenial" workers (born between 1981 and 2000) tend to view it as an important enabler for building social connections and trust with colleagues [21]. This is particularly the case for the creative and knowledge-based industries where playful office artifacts and engaging spaces are designed to encourage innovation, creativity and collaboration. Fun is viewed as being organic and an asset that can facilitate bonding and the building of harmonious relationships and collaborations amongst employees.

As well as links to increased innovation and productivity [25], academic studies have also linked workplace fun with increased physical wellbeing [12] Organisational Citizenship Behaviour [10], job satisfaction [16] and decreased absenteeism [22]. Management are very aware of the positive benefits and many companies now deliberately introduce fun at work through social practices such as networking/team building events. Although enjoyed by many, for some employees this kind of management-led fun is resented due to the expectation to participate and have social practices imposed upon them [5].

Several tech companies have hired interior design experts in an attempt to create more engaging and conducive office environments. One method has been to place people in open spaces and smaller spaces to make "collisions" between colleagues more inevitable [31]. Another initiative is the Randomised Coffee Trials (RCT) [24] where employees are randomly paired with another staff member each week to sit and have a coffee together. A more persuasive approach at getting people to spend time together is to make it difficult for them to leave. For example, Yahoo!'s ban on telecommuting is intended to encourage people to spend more time physically together working and socializing [30].

While these kinds of incentives and initiatives can have a positive impact on the office environment they can, by the same measure, be perceived negatively by employees if not implemented in a sympathetic way. Top-down approaches to engendering more social working practices can be socially awkward for some. While randomly being paired up with someone for coffee can be a fun way to meet other people in the office, it can also be daunting especially for those who are shy. Moreover, such "packaged fun" can have the opposite effect of what is intended, leading to reservations about obligations to participate. It can also feel artificial, where management are viewed as trying to codify or organize social practices, that people feel should occur more naturally.

Technology Interventions in the Office
Another approach to instilling a sense of togetherness and social cohesion in office settings has been to deploy various technology interventions. A general observation is that such technology interventions have typically taken a more organic or non-intrusive approach to affecting office environments; not requiring employee participation or large amounts of employee time and effort.

Early attempts included using remote video conferencing as a way of promoting a shared space across buildings in different locations. For example, the VideoWindow, developed at Bellcore in 1989, was designed to allow people in different locations to have a conversation as if they were drinking coffee together in the same room. A large video window measuring 3 foot by 5 foot connected the two sites. A study of its use found conversations did take place between people as if they were drinking coffee with each other but that they spoke more loudly and mostly about the video system itself [9]. Since then, a number of other video links have been deployed to promote connectedness and awareness across remote working sites by streaming images between one site and the other [4, 8, 10] onto PCs or large public displays [15, 29]. Nowadays such technology is ubiquitously used for scheduled

meetings between colleagues and others but remains a poor facilitator of more informal social events.

Others have argued that technology can have a more playful role in the workplace [28]. For example, the PLEX model of playful experiences explores at a theoretical level the reasons why people play and the benefits of doing so in various contexts including work [18]. Monk [23] notes how blurring the boundaries between tools and toys can be useful in the workplace and highlights successful examples that span both categories, such as the UNIX process manager based on the video game "Doom" [7].

More recently, various physical technology interventions have been introduced in the workplace to elicit more playful and lighthearted experiences. For example, Arnie the talking beer vending machine, was designed to attract employees into communal areas with the promise of free beer and the opportunity to chat with colleagues [1]. Arnie's humorous chatter was found to foster playfulness and to instil a sense of pride and ownership among employees. Vending machines have also been repurposed to encourage people to visit them and in doing so have serendipitously elicited the honey-pot effect [6]. For example, a snack vending machine was reengineered to invite students to grade exam papers whereupon completion they received free chocolate bars [13]. In doing so, it also encouraged them to talk to others while hanging around the vending machine. In contrast, the Break-Time Barometer was designed explicitly to persuade people to come out of their offices and socialise more [17]. The system displays how many people are currently in the staff common room; if there are people there it suggests it would be a good time to join them for a break. Interestingly, however, the opposite often happened. Employees also used the system to gauge when breaks *weren't* happening so that they could take a break without their colleagues being around for company.

Another persuasive technology that triggered much debate amongst colleagues was the Twinkly Lights and Clouds installation that was designed to playfully nudge employees towards taking the stairs instead of the elevator [26]. Two clusters of differently colored balls were hung in the atrium, to appear like clouds, and which moved up and down relative to each other depending on how many people had taken the stairs versus the elevator at a given time. The ambiguous nature of the installation was found to cause people to reflect upon what they meant. There was curiosity and many explanations were generated and exchanged about what the clouds represented with some managing to figure out that they represented something changing in the building. The overall effect was to elicit many conversations throughout the building between people who did not normally talk to each another. Similar to Arnie, it provided the occupants with a sense of ownership and pride when showing it to visitors.

AIMS AND OBJECTIVES

The aim of our research, likewise, was to determine if we could encourage people to be more aware of each other and their place of work by introducing a playful technology that would trigger reflection and conversation. But instead of seeking to promote behavioural change in an organization, the specific goal of our study was to explore the impact of a playful technology on a "serious" work culture. Could it encourage more playfulness, positivity and community pride in the workplace? Or would it be simply ignored or even make people annoyed?

The challenge, therefore, was to create something that could initially attract peoples' attention, was lightweight and fun to interact with while maintaining interest over a period of time. Furthermore, engaging with it should not make people feel socially awkward. To this end, we focused on how to get people to think about how they were feeling at various points during the day and moreover to wonder what others were feeling. While there are various smartphone apps available that allow individuals to track their moods by filling out a short questionnaire at random times each day, they are individually-based and hence privy only to those who choose to use the app. We wanted to design a physical installation that was very much 'out there' for anyone to use throughout the day as they moved through parts of the building. To this end we designed a public installation that required playful input and whose output was projected onto a large floor display for all to walk past and observe. The aim was to provide a lightweight way of cascading conversation throughout the building about people's mood and what others in the building had also expressed.

We were interested in examining people's reactions on first discovering the installation and then subsequently using it, and seeing how others reacted and used it. Would people find it intriguing or silly? Would they reflect on how they were feeling and ask others? Would they talk to each other about it? If so, where and when? Would it engender a sense of connectedness in the building? But to begin, we conducted a preliminary survey in the workplace to get a baseline of how employees viewed their current working environment. The results of the study were used to inform the design and placement of the installation.

THE SETTING
Figure 1 shows a typical view down one of the workplace corridors. Over 200 inhabitants are split across five floors with one communal lift lobby on each floor and one coffee room shared by all floors. Each floor comprises a combination of closed offices on the outside and open plan windowless spaces and corridors on the inside.

PRELIMINARY SURVEY
An online survey was initially conducted on the occupants of the building to elicit their views about the workplace. The survey results showed a number of negative trends. For many, the workplace was not an enticing space to come to

each day. From a total of 84 responses, 76% said there was *not* a strong sense of social connectedness in the workplace and 68% felt that management did not do enough to address this. Additionally, only 11% of respondents felt more connected to current colleagues than they had done to colleagues in previous places of work. However, when asked about fun, informal events such as birthday drinks, 67% of respondents agreed that they found them enjoyable. In fact, 92% of respondents indicated that they would like to see more opportunities for informal activities and engagement in the workplace.

To investigate further, we asked 26 of the respondents, who agreed to be interviewed, a further set of questions. To avoid bias, the interviews were carried out by a social scientist from another organization. Each interview consisted of a range of semi-structured questions, partly shaped by the outcomes of the survey. The interviews were transcribed and coded for recurrent themes. These emerged as (i) building discomforts, (ii) social silos, and (iii) serious work ethic.

(i) building discomforts The majority of interviewees highlighted aspects of the building design that were considered depressing. These included a lack of sufficient communal spaces, isolated offices, lack of natural daylight and open plan offices that were either too noisy or resembled a library. For these reasons, working from home was a popular choice among the interviewees.

(ii) social silos The interview results also revealed that there was a strong culture of 'social silos' in the workplace. While all interviewees felt that there was a good level of social connectedness within their own working group, they mentioned that they did not engage with other groups. Even when two separate groups were co-located on the same floor or in the same open plan area, there was little interaction between groups or awareness of what the other group was working on. This was viewed as most problematic when group members were not co-located or where working groups were particularly small. One participant spoke of his isolated experiences, "*what happened to me, for the first year, I was completely alone. My supervisor, me, and no interaction with anyone. And I think my story is similar to a lot of people that are working on something alone.*"

(iii) Serious work ethic Interviewees expressed a desire to get to know and relate to their colleagues but felt that it was almost impossible to speak to someone without an introduction or some other appropriate justification. One respondent noted that, "*occupants of the building with whom I am not personally familiar with are the same as strangers on the street to me*". Another mentioned, "*I have met a number of colleagues, by chance, at conferences overseas, and only realized that they were colleagues when I got talking to them in a bar after a workshop*". Some respondents suggested that the serious nature of the workplace made spontaneous interaction particularly challenging due to the introverted nature of some employees; a working culture of deadlines and solitary endeavor; and living in a large city where attitudes of minding-your-own-business and not talking to strangers are normatively enshrined. These findings suggested that there was a need to 'open' up the building more by providing opportunities throughout the building for people to meet and talk to others. While it is not possible to address the building discomforts identified there is scope for finding ways of breaking down the social silo mentality and the serious work ethic.

DESIGN

To begin, we considered what kind of intervention would be appropriate given the existing culture of the building. We decided to design a technology installation that would give employees and visitors an opportunity to do something fun when moving through the communal spaces on each floor, by the elevators and stairwells, where they might bump into other colleagues from different groups. We wanted them to engage in a lighthearted activity that would allow them to reflect and talk about how they were feeling. It could also provide them with a means of "expressing their emotions", especially if they were having a bad or good moment.

The design we finalized on was a tangible 'SqueezeBox' comprising a row of colored balls (see Figure 2a) that could record people's moods. The design was inspired by how stress balls are used by people. However, instead of being an individual act someone does when stressed, we chose to repurpose the balls as playful, tangible inputs for people to squeeze to express how they are feeling. The addition of color was inspired by previous explorations into mood, color and taste (including a pilot study where we asked people *"what color does your tap water taste like?"*). The mapping of mood to color was deliberately open ended. The intention was to trigger subjective discussions between employees on what mood and color meant to them and to allow people to assign their own rules and appropriate the technology in line with their own views.

The choice of ball colors and the order and placement of the balls on the SqueezeBoxes was aesthetically driven and bright, complimentary colors were chosen from across the spectrum. A poster (see Figure 2a) was designed to be placed above each SqueezeBox, inviting people to "Squeeze the color of your mood".

The output of the squeezes was mirrored in the form of a public floor display visualisation (see Figure 2b) and web-based display (see Figure 2c). When people from different floors squeeze a ball, the color of that ball appears on the digital floor display for everyone to see. To this end, a large digital floor display [3] was repurposed that had previously been set up on one floor of the building. The display was designed to be eye-catching when turned on. It is a large matrix comprising 6 adjacent squares that have glass holes

| a) SqueezeBox | b) Digital floor display | c) Webpage |
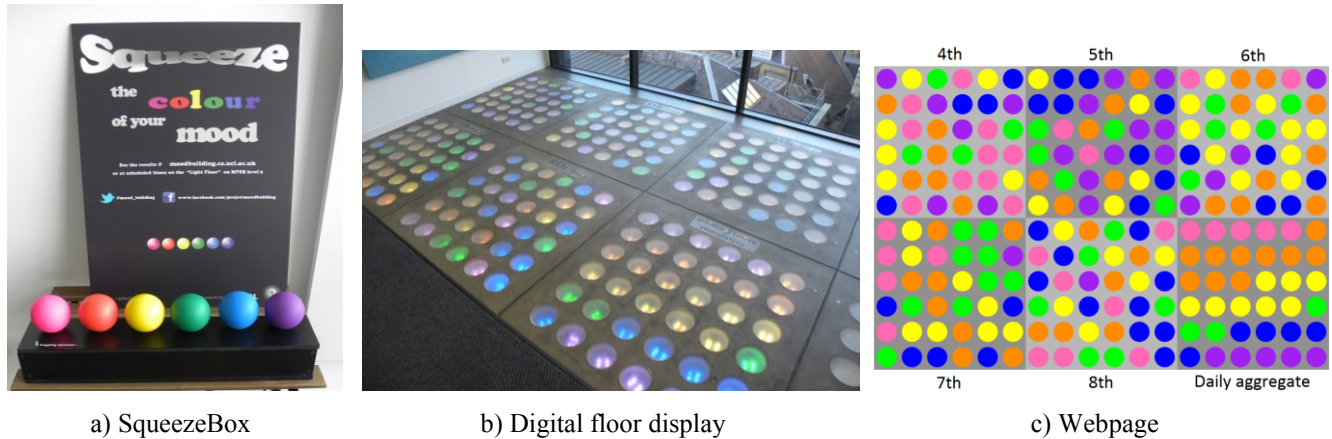
Figure 2. Images of the input and output devices; a SqueezeBox, the digital floor display and webpage.

in them that are lit up from underneath by a set of LEDs – five of the squares were used to show the mood of five of the floors in the building, respectively. The sixth square was updated every minute to represent the aggregate mood color of the whole building, showing how much each color had been squeezed throughout the entire building that day. For example, if pink was squeezed 30% of the time that day, 30% of the sixth square would turn pink. The digital floor display was labeled with vinyl floor stickers to indicate what each square represented.

The SqueezeBoxes and the digital floor display were controlled by Arduino technology. The SqueezeBoxes used Force Sensitive Resistors (FSRs) inside each ball to detect when a squeeze was happening. All squeeze data was sent via WiFi to a backend server that processed and logged the squeeze data as well as relaying it to the digital floor display and the live webpage. In this way, both output mechanisms were updated in real-time and one could see how a squeeze immediately affected both displays.

The webpage provided an online representation of what was displayed on the floor. This was to enable people also to see what the overall mood of the building was and that of the separate floors from their desks or from home. A Twitter feed and a Facebook page were also created to provide updates about the study as it progressed and to support any online community that could potentially form around it.

METHODOLOGY

An in-the-wild study was conducted to determine how people in the building reacted, interacted and reflected on the Mood Squeezer [26]. It was deployed for four weeks to provide enough time to investigate the initial novelty effect (i.e. the first few days) and then to see how it impacted on the working environment over a longer period of time (a further few weeks). After the official 4-week deployment had ended (and building inhabitants had been notified) we decided to leave the SqueezeBoxes in place for an additional 4 weeks. This follow-up period was to determine

the extent to which people continued to squeeze even after they had been informed that the study was finished.

The Mood Squeezer was installed and tested during a weekend so that people entering the building on the Monday morning would find it up and running when first arriving at work. An email was sent to departmental mailing lists to announce its deployment, introduce the digital floor display and provide links to the floor webpage, Twitter feed and Facebook page.

The floor display was activated for 2 hours on each day of the deployment. The reason for this was to encourage staff to come and look at the public visualization display when switched on during a limited period and interact with colleagues rather than being on all the time. During the additional 4 week follow-up period, the floor display was not activated but the website was still available.

Both quantitative and qualitative data were collected during the in-the-wild study. The number, time and location of squeeze data were collected together with observations of what people did at the SqueezeBoxes and the floor display on a daily basis. The observers sat in one of the chairs placed in the communal spaces. Sometimes, when interesting behaviors or conversations materialized, an observer asked the person/s questions – in a way that was not off putting but could have simply been anyone in the building. Observations, discussions and comments were also recorded throughout the building during the four-week deployment.

Building access data was also retrieved from building security. This showed a time-stamped list of all building entry events on the ground floor turnstiles and allowed us to see how busy the building was on each day of the study for comparison against squeeze counts. On the final day of the official deployment period, an exit survey was emailed to all staff within the department to obtain their feedback. In addition, another series of interviews was completed with 25 of the 26 staff members who participated in the

preliminary interviews (one member of staff was unavailable due to being on vacation). These interviews focused on their engagement with the Mood Squeezer and asked how/if it had impacted on their daily work life. The interviews were semi-structured and each one was recorded, partially transcribed and coded for recurrent themes.

The quantitative squeeze data is presented and discussed below along with the qualitative results of the in-the-wild observations, exit survey and final interviews.

RESULTS

When arriving in the building in the first week many people stopped to look at the Mood Squeezer and squeezed a ball as indicated by the logged data. A large number of people continued to squeeze the balls, sometimes several times a day, over the course of the study. Their moods changed as reflected by the colors they selected. Many conversations about the installation inside and outside of the building were observed, that included a range of both positive and negative comments. To examine in more detail these findings we first look at the quantitative data collected.

Quantitative Analysis

Squeeze Data
The squeeze data shows that there was a consistent level of interaction with the SqueezeBoxes during the course of the four-week study, with a total of 3,689 squeezes. Figure 3 shows the daily squeeze counts against the building entry figures (based on total entry events where several events may be the same person) across the official four-week deployment. Initial daily squeeze counts were high, averaging around 300 squeezes per day, dropping off to a sustained level of around 130 squeezes per day for the remaining weeks. Squeeze levels peaked at the beginning of each week and declined as the week progressed in line with building entry figures.

The main peak of the squeeze counts over the course of an average day was around 10am (when most people arrived at work) followed by three more peaks at 12pm, 3pm and 5pm, with each peak being slightly less than the previous. Further analysis of the squeeze data did not uncover any other significant patterns. There was no floor that showed significantly more squeezes than the others, and equally there was no ball color that was squeezed significantly more than the others.

To get a better understanding of how many distinct users were interacting with the SqueezeBoxes we also analyzed the data for 'multi-squeeze events'. These are events where 2 or more consecutive squeezes were registered in quick succession of each other (less than 10 seconds) indicating that those squeezes were most likely by the same person. The data shows that 38% of all squeezes were part of a multi-squeeze event suggesting that there were some individuals who seemed to enjoy repeatedly squeezing the
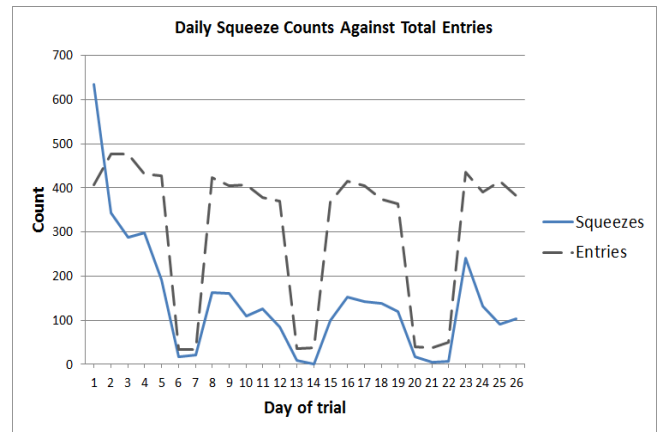
Figure 3. Daily squeezes against building entry figures.

balls during a single visit but that most people (62%) squeezed only one ball each interaction.

There was little online engagement with Twitter and Facebook. Only twenty-one people liked the Facebook page while eight people followed the Twitter feed. In contrast, there was a much higher level of web page traffic with a total of 725 logins to the floor webpage over the four-week deployment period. This suggests that people were curious to follow the building mood trends but were not motivated enough to engage on the official Facebook page or Twitter feed.

During the four-week follow-up period (when the SqueezeBoxes remained in position after the official deployment ended) the results show that a stable average daily squeeze count of 121 squeezes per day was still maintained despite the fact that users were told the study had ended. This sustained plateau of usage suggests that the novelty effect may have subsided by this time however we cannot know for certain.

Exit Survey
A total of 34 responses were received for the exit survey. Due to the small number of responses we suggest that these results be seen as indicators for impact that should be considered in conjunction with the other quantitative and qualitative results. The exit survey results showed that 96% of respondents stated they had interacted with the SqueezeBoxes during the 4-week deployment period. 41% of the respondents visited the floor display when it was active, and 31% visited the webpage. In terms of interactions between colleagues, over three quarters of respondents (77%) discussed the SqueezeBoxes with others whereas the floor display and the webpage were only discussed by 32% and 7% of respondents, respectively. 26% of respondents stated that they had discussed some element of the study with a colleague who they had not spoken to before – which is higher than expected considering how rarely this was found to be the case in the pre-study survey.

The general attitude towards the study was positive with 71% stating that they found it enjoyable to have the system in the building (with a further 15% as neutral) and 59% stating that they thought similar interventions in the future would be beneficial to the working environment (with a further 22% as neutral).

Qualitative Analysis

In-the-wild Observations

During the four-week deployment phase, observations were made on a daily basis for the two-hour period when the floor display was active. The observations captured some of the diverse ways in which individuals engaged with the SqueezeBox and floor display. Some individuals took a moment to reflect on their mood before selecting a colored ball (figure 4a). For others the engagement was performed very rapidly as they hurried past a SqueezeBox. A number of individuals adopted a more playful approach to engagement by rapidly squeezing many balls in quick succession as if playing a game or musical instrument. It was also observed that other individuals adopted one color and only squeezed this particular color each time they passed by. Others went a stage further by continuously squeezing their chosen color until it monopolized their floor - again as appropriating it like a game or challenge. In one case, the continuous squeezing prompted a staff member from another floor (who was viewing the real-time updates on the webpage) to query if there was a faulty squeeze sensor.

Several occupants brought their friends, guests and children to visit the SqueezeBoxes and the floor display. They were also observed making comments related to a level of identification with, and appropriation of, the installation. For example, one said, "*we have a box on our floor too*". Others commented on the overall state of the selected colors, "*pink is the most popular color at the moment*". Others gave instructions to their visitors on how to interact with a SqueezeBox, "*you have to squeeze the color of your mood and it appears on this floor*". On a few occasions, groups of individuals were observed laughing and having fun around a SqueezeBox and the floor display. While one person squeezed the balls the others watched for a light in the display to change color.

In addition to observing people, overheard comments or discussions were also recorded throughout the building. Staff members were overheard discussing the study in the elevators, while outside smoking and at out-of-hours social events, as well as around the SqueezeBoxes or floor display. In the majority of cases, the discussions related to reflections on their mood or subjective views on the relationship between mood and color. Groups of individuals were observed congregating around a SqueezeBox and collectively deciding on what color to squeeze (figure 4b). Discussions also centered on hypotheses to explain the choice of color or the arrangement of the balls. For

a) Squeezing a yellow mood   b) Group interactions at a SqueezeBox

Figure 4. Interactions with the SqueezeBoxes.

example, a common assumption emerged that the balls were arranged from left to right in a scale from most positive color (pink) to least positive color (purple). Indeed, several exit interview respondents confirmed that their color choice was influenced by the comments or assumptions of others. Some individuals had very strong opinions about the mapping; for example, two females were completely adverse to selecting pink as they saw it as a "*Barbie*" color and refused to squeeze it in an act of non-conformity towards the color conventionally associated with girls' toys, clothes, etc. Another member of staff commented that she had associated a different color with each day of the week since she was a young girl and could only squeeze the "*day's color*" no matter what her mood.

On some occasions, a potential squeezer was observed "swerving" away from the SqueezeBox when they realized that someone else was present in the space and might be watching them. When queried further about this behavior, the participants admitted that they felt self-conscious or embarrassed squeezing the balls in front of other unfamiliar colleagues. This suggests that there are two kinds of people: those who are happy to squeeze and those who felt embarrassed in taking part.

Other, discussions were about the technology behind the SqueezeBoxes, such as how they worked or what the study was actually measuring. One individual was even observed with a screwdriver in his hand inspecting the internal electronics of a SqueezeBox!

During the two hours each day when the floor display came on it was observed that few people came to see it. In the first day of deployment only ten people came specifically to view the floor. This dropped off to just a few by the end of the first week. Then in subsequent weeks, it was observed that only passers-by stopped to view it on their usual route on that floor. Discussions about the floor display were rarely captured (however, several people did mention discussing it in the exit interviews). One reason for so few

people deviating from their routines to explicitly watch the floor display might have been because walking up or down the stairs or taking the elevator to the 6th floor was a step too far for those who did not normally go there. Another reason might have been that they were not aware of the time of the floor display being lit or they were busy during that period – we only posted the times once in an email that could have been overlooked by many (we did not want to annoy people by sending reminder emails). In contrast, we observed many people interacting with the SqueezeBoxes and then looking afterwards at the results of their squeeze on the website via their phone or tablet. This raises the question of the value of having a separate public floor display as a focal point for all the squeezes from each floor to be shown in this kind of multi-story building.

Exit Interviews

The people who were interviewed after the study were positive about the technology intervention. One respondent for example, commented, "*I enjoyed the project and thought it brought some fun to the building*" while another added, "*the most positive outcome for me is...finally seeing people in this mini 'desert'. I could see colleagues from the floor out of their office for the first time.*" Even those who did not engage with a SqueezeBox commented positively on the visual design of the Mood Squeezer. All agreed that they would like to see more of these interventions appear again in the building.

A number of themes emerged from the interviews about the value and role of such an intervention in an office building where 'serious work' is the norm. These were playfulness, reflection, emergence of social norms, ice-breakers and conversations, openness, groups and honey-pots and showcasing and pride.

Playfulness: The SqueezeBoxes were viewed as playful, fun and innovative. Their presentation was regarded as suitably simple and well-positioned in the communal spaces. The balls were visually and texturally appealing and the interviewees who had squeezed them, commented on the joy of interacting with them: "*They were nice to touch because they were squishable*" (P8). They reminded many respondents of childhood toys and the bright colors of the balls engendered feelings of being light-hearted. It encouraged them to spontaneously be playful around them. One interviewee said, "*... we were like going up and down the floors trying to change the color, but there was a point where the fifth floor was all yellow and then I ran to the fifth floor to try to change the color and there was a person running after me*" (P2). Another commented, "*I went to another floor that was all blue...to change the color or squeeze lots of different colors*" (P6).

Comparisons with stress balls also meant that the SqueezeBoxes were often used as a de-stressing tool. One interviewee commented that they had observed over vigorous squeezing on some occasions prompting them to

post on the Facebook page that colleagues should "*squeeze, not bash*".

Reflection: For some, engagement with the squeezy balls became a more personal activity that evoked self-reflection and thought. One interviewee talked about how it made him think more deeply about his mood: "*I tried to do it based on how I felt, which was a bit odd I suppose, because you think what does it mean if I'm feeling yellow or whatever*" (P3). Another gave a detailed description of why he preferred to squeeze pink, "*I kind of squeezed the pink one the most, but it wasn't because it's close to red, meaning I'm angry. So I was instinctively going towards blue because I'm a guy, but then I was like, blue means you're sad. I didn't like the blue. So I was like, I'm not blue. And the yellow means you're ill or something. Orange is like you need to be in the A&E, so pink, like, okay*" (P4). Others suggested they would have liked even more colors to select from to capture their moods, such as black.

Emergence of social norms: Several interviewees expressed their frustration that others were not abiding by "the rules" of squeezing the color of their mood. One mentioned how it made him anxious when he saw others squeezing balls randomly in quick succession. In addition, the open-endedness of the mood-color relationships also made people want an accepted mapping to emerge that everyone would use. For example, one interviewee said, "*I discussed it and realized that my assumption is that it's a scale from happy to sad. I realized that I just randomly made that assumption because so often you do something like that, to represent it in a scale*" (P6). For others, the fact that there was no accepted mapping to begin with was what made it interesting for them to decide what might be appropriate.

Ice-breakers and conversations: The deliberate open-ended mapping between mood and color often acted as a point of discussion between people in the building. It became a conversational ice-breaker in socially awkward situations, such as waiting at the coffee machine or being in the elevator with colleagues who were familiar but not well known. Several interviewees mentioned how the usual mundane small talk about the weather had been replaced with discussions on mood-color and squeezy balls. This sometimes led to more lengthy, in-depth discussions, as described by participant P2: "*It was like extensive discussions and several times…not only one and not only with my colleagues here. Also back home with my family and my friends*". Conversations about the Mood Squeezer also regularly happened outside the workplace. Many interviewees spoke of the discussions they had subsequently with friends and family. Even the interviewee who did not squeeze the balls admitted to discussing the Mood Squeezer at length with colleagues in the pub.

Openness: Being able to talk about one's mood helped many start a conversation. Interviewees talked about how they and their colleagues became more open with each

other about how they felt. One interviewee stated, *"and I think also…we have been more open about how we've been feeling during - whilst it's been out there. And that in itself has to be a good thing. So it's had a lot of maybe indirect effects that are actually quite substantial in a way. And the fact that people have been sort of reflecting on their moods has kind of hit a few things home to me, ... that the moods can be quite variable"* (P18). Another said, *"it was really good in that people were very mindful of their moods, and kind of talking about it, and I think it created a lot of excitement around the department as a whole"* (P11).

Several other interviewees spoke of the excitement, buzz and a positive department-wide impact on the working environment. One interviewee said, *"well it did sort of liven the place up. I suppose it did. In a bizarre way though, not in a straightforward way. It wasn't like a piece of art"*. Another interviewee mentioned, *"so what I liked is the fun, with people and squeezing and talking about colors"* (P18).

Groups and honey-pot effect: Several interviewees commented on how they had noticed or been part of a group activity around the SqueezeBoxes. They talked about squeezing in groups and observing other groups of people squeezing and collectively deciding what colors to choose. One mentioned how the floor display made him and his colleagues stop, view and discuss it, *"[We] went up to the floor display and basically…we were exchanging, so what color do you think you'd squeeze the most and we were theorising how it might be displaying the colors on the floor. What kind of algorithm was being used to choose when they were being shown and what that meant"* (P6). Another said, *"people were hanging [around the floor] and talking about the project so that was great"* (P16).

Showcasing and pride: Some interviewees expressed pleasure at the showcasing of the research work going on within the department. In the preliminary interviews, many interviewees expressed disappointment with the current lack of communication of research activities between various work groups. It was mentioned how the Mood Squeezer provided an example of how this could be better achieved without the need for a more formal forum (such as organized seminars). One interviewee commented, *"I mean here, we've got such a large building and we've got some people doing some great work, but you don't hear about it half the time….this is definitely a way of trying to showcase some of the work that we do"* (P4). Another mentioned how he showed it off to visitors, *"there were a couple of people visiting my lab. They don't work here but they came for one day to present their work and they have a discussion with me and then I was taking them to the balls, like you need to see this"* (P2).

Others talked about feeling proud of the Mood Squeezer. One interviewee referred to it as being like a *"shiny, new water-cooler",* in respect to their attraction and creation of spaces where people could gather for informal activities.

DISCUSSION

The findings from the study suggest that the Mood Squeezer did impact positively on the workplace by encouraging people in the building to be playful, talk more and reflect on various aspects of the organization, the building and their work. The SqueezeBoxes encouraged people to reflect just for brief moments throughout the day without being disruptive or for the most part making people feel socially awkward. Only a few felt the SqueezeBoxes were too childish for such a serious place of work. Most occupants really enjoyed having the SqueezeBoxes become part of the building while some were put out when they were removed after the study. Like the Twinkly Lights and Arnie, they became attached to them and developed a sense of ownership and even pride.

The design of the installation was such that people in the building were free to opt in or out of playing with it as and when they wanted and investments of time and effort were very low. In this way, it was non-intrusive and did not distract from important work matters. However, as observed, people did not often visit the public floor display on the sixth floor. Instead, those who wanted to see the outcome of their squeeze would bring up the webpage on their smartphone, tablet or laptop. It seemed it was too much for people to go to another floor and stand around looking at the visualization. This suggests that the coupling between input and output is context-dependent. The reason we decided to have only one public display rather than one on each floor was that we were able to reuse an existing installation in the building. To have made four more, for each of the other floors, would have been too impractical. Future research could investigate what the effect would be of having other kinds of distributed public displays adjacent to the Squeezeboxes (that are easier and more affordable to make), or have one placed in a central communal space, such as a reception or atrium area, that everyone has to enter through.

Our research inevitably raises the question of whether all we have done is elicit a novelty effect. We would argue that a novelty effect is integral to further sustained engagement. The quantitative data showed sustained usage of this lightweight intervention over eight weeks (four weeks in the official study period and four outside) suggesting it provided people with moments in the day to reflect and something to be shared and talked about with others. We do not suggest that one playful technology intervention will impact on the workplace forever. Rather, that the playful technology implemented in this study showed how it can help towards making a more open and positive work environment for a few months. We suggest that such playful technologies may be used in concert with other kinds of interventions that are changed over time in order to sustain an open, positive atmosphere in the longer term.

Below, we discuss at a more general level how playful interactive installations, that involve constantly changing

user input coupled with real-time feedback, can be engaging and uplifting for an office. We also discuss the extent to which such interventions can encourage more social cohesiveness and a sense of well-being – for closed office and open plan buildings that make people tend to stay at their desks. These are discussed in terms of their role on the working environment at three levels: self, inter-personal and organizational.

(i) Self
Results from the in-the-wild observations and the exit interviews showed that the technology intervention provided an opportunity for employees to take time out of their work routines to be playful and lighthearted. Instead of just dashing to get a coffee or going to the toilet, squeezing their mood at one of the Squeezeboxes gave them an opportunity for self-reflection about their mood and feelings. People don't often do this. Equally, it could be argued that a smartphone app could trigger random moments to encourage people to be mindful. However, arguably these are likely to be more disruptive – especially if someone is in the middle of doing something. The squeezy balls were designed simply to catch someone's eye and nudge them to squeeze and reflect if they felt like it rather than having to answer a random set of questions pushed at them via an app. They can simply be overlooked if that person is too busy.

The Mood Squeezer also highlighted social norms in the workplace. For example, some individuals like, and want to stick to rules (such as squeezing their mood color) even getting anxious when others don't follow them. In contrast, others completely disregarded the rules, looking for more playful or personal ways to appropriate the technology. It would be interesting to explore further the extent to which the norms and rules, by which people play, converge over time. The intervention also highlighted the strong relationships that individuals have with colors. For some, certain colors represented stereotypes, conformity or other deeply ingrained associations from childhood and hence squeezing a ball was a statement rather than a frivolous choice related to their mood.

(ii) Inter-personal
The findings all suggested that the technology intervention impacted on interaction and social connectedness between colleagues. Playful interactions and joshing were observed around the installations; some colleagues competed with each other to manipulate the overall mood visualization to be all of one color.

There was much discussion on various aspects of the intervention, mostly driven by the open-ended relationships between mood and color. It provided an interesting icebreaker in socially awkward situations and the survey results showed evidence that the intervention also triggered discussion between previously unknown individuals. People were much more open with each other about their feelings at work and also reflected on how others felt their moods

varied during the working day. People also discussed their chosen mood-color mappings and exchanged subjective views with one another. Baker [2] describes such interactions as High Quality Connections (HQCs), defined as having higher emotional capacity, resilience, and openness to new ideas and influences. Discussions about the project and mood-color relationships continued throughout the official deployment phase. At the end of week 3, conversations were still observed in the elevators and between smokers standing outside the building. In week 4 additional comments were still being captured about what specific colors meant to individuals.

(iii) Organizational
The results of the in-the-wild observations and interviews suggest that the technology intervention increased pride and positivity in the workplace. The occupants discussed their workplace and the installations within, at home and while out socializing. The installations acted as a showcase and live demo of current research happening in the department and were proudly presented to friends, family and guests. Some people even brought their children into work to view and interact with them. The installations also gave people a better sense of other work that was going on within the department and was seen as a beneficial way to share work and ideas without the need for a formal forum such as a seminar or a workshop. Indeed, they created a general buzz throughout the department with interviewees talking of excitement, liveliness and fun.

Generalization to Other Workplaces
Our research explored how a public and playful installation that was designed to be lightweight and fun for everyone to interact with, can have an impact on a 'serious' workplace. While a few people found it annoying or it was not for them to be seen playing most people enjoyed the light-heartedness of being able to squeeze and reflect on their mood. Certainly, it would have caused more annoyance, if it had been mandated or we had pestered people more to squeeze their mood. Hence, we argue that for these kinds of playful interventions to be effective they need to be enticing and fun.

One could question if the positive impacts found in our study were specific to the culture of the particular building and the nature of the work carried out there. Informal communication about the study through blogs, tweets and seminar presentations has led to others showing considerable interest in the approach. Since the completion of the study, we have been contacted by a number of external organizations, having quite different cultures, that have cited similar issues in their own offices. In response, a second study is already underway that has repurposed the technology installation at commercial offices in the Canary Wharf area of London. The context of the building and nature of the work is very different to that reported here. Early indications show that the intervention is having even more of an impact at the self, inter-personal and

organizational levels. Engagement levels are high; fun and play have already developed around the installations and there is a buzz in the office with much discussion and intrigue around color and mood.

CONCLUSIONS

It is well known how a working environment can affect the wellbeing and productivity of its occupants. While creative and tech industries are designing new offices to meet a variety of needs besides just a place to work, many offices were built to be more utilitarian and maximize space. Here, we have revisited the theme of play in the workplace, putting a fresh spin on previous work by using tangible, playful technologies in a serious working environment. We have shown how a playful technology intervention was introduced into an established serious workplace with a positive impact at the individual, the group and organization levels. As such, we suggest our results merit further investigation into the role of playful technologies in similar serious working environments. In particular, technologies that can provide people with moments to reflect throughout the day by themselves and with others, but most importantly without being annoying, or getting in the way of their work.

ACKNOWLEDGMENTS

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