



D5.3 RELATIONSHIP BETWEEN DIDIY AND SOCIAL CHANGE

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Executive summary

This deliverable explores what making means to makers. It investigates how digital affordances are changing opportunities for making and suggests how making, particularly in the context of global digital connectivity and digital fabrication technologies, impacts on makers themselves and has implications for wider society. The deliverable is based on two series of “Makerlab” and “Spark” workshops held in the UK in 2016. In total 9 Makerlab workshops were carried out in maker spaces and making-related community spaces. These were active making workshops where 95 participants, in total, responded to an invitation for “makers” to take part in workshops. Within these workshops participants used a range of simple craft and construction materials – including LEGO, pipecleaners, bells and buttons – to describe and explore their creative practice and making experiences, relating their creative practice to digital technologies and the wider world. In addition, 6 Spark pop-up creativity workshops were held in public libraries. In these workshops members of the public used digital tools, including littleBits electronics, to take part in a team design challenge, and to explore the potential for making in public library settings.

The results confirm and extend the findings of D5.2, “Social impact of DiDIY”. A range of personal and social impacts are explored through the first-hand accounts of the 136 participants who attended workshops and completed questionnaires. Concerning the Makerlab workshops, this deliverable gives multiple examples and summaries of their views, from participants expressing a deep sense of satisfaction and enjoyment gained from their making activities, to an understanding of new digital mechanisms and opportunities for sharing and connecting. The significance of making from the perspective of these makers ranges from having fun and enjoying creativity, to developing a problem-solving attitude, gaining confidence, feeling more connected and an enhanced sense of well-being. The potential community, entrepreneurial and environmental implications that these makers envisaged and expressed are described and explored through further examples of the metaphors and representations created in the workshops. The results from the Spark workshops are also presented here. These workshops demonstrated the capacity for engagement and fun with DiDIY technologies, tested the appetite of participants for a design and making challenge, and explored their views regarding the suitability of public libraries as sites for making activities.

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Introduction

This deliverable explores the makers' perspective of the relationship between Digital Do It Yourself (DiDIY) and social change. It is based on research undertaken in 2016. The data that forms the basis of the deliverable is the outcome of two comprehensive series of workshops run by the University of Westminster as part of the DiDIY Project. This deliverable considers the two series of workshops separately. The first series of workshops were promoted as "Makerlab" workshops, and involved 95 participants. The second set of workshops, in public libraries, were called "Spark" workshops and involved 41 participants.



Part A: Makerlab Workshops

1. Background

1.1 The Task

The Makerlab series of workshops was undertaken to meet the requirement of Task 5.2 in the DiDIY Grant Agreement which states:

Task 5.2. Makerlabs (M15-M22) (Leader: UoW)

To generate answer[s] to the five research questions related to this WP, we will run a series of 8 workshops for makers, where participants will be encouraged to make things that reflect upon their process and experience of making things and the changes which this can bring in social participation.

1.2 Workshop planning

The research team met for a series of preparatory discussions followed by a one-day planning workshop in early 2016. This workshop considered issues such as possible workshop content and formats, venues, partners, recruitment, and timing of the Makerlab workshops. Two fundamental research questions were proposed:

- what do makers get out of making;
- what makers think society gets out of making.

1.3 Definition of ‘maker’

It was agreed to be as inclusive as possible, not to impose any particular view or definition of the ‘maker movement’ (as it was felt this may exclude some makers arbitrarily) and to take a broad-based approach to the definition of ‘maker’. The workshops therefore needed to be accessible to a wide variety of people who self-identified as ‘makers’. For further information about definitions of ‘maker’ used within the this Project, see the Project website: <http://www.didiy.eu/vocabulary-of-digital-do-it-yourself>.

A brainstorming session on the possible thematic areas of impact that might be relevant was conducted among the research team. Team members were asked to write down the possible motivations for making that could be explored with makers during the workshop activities. This resulted in a list of around 40 areas that could be explored.

Having gone through this useful process of attempting to identify motivations that might be applicable to ‘notional’ groups of makers, as well as a discussion of the potential impacts of making, and a process of post-it note ideas generation and mapping, it was concluded that there were usefully two groups of ‘impacts’ that could be broadly identified – inward looking and outward looking.

1.4 Synthesis of inward looking impacts

Inward looking impacts included all impacts on an individual’s life from engagement with making, such as having fun, meeting people, changing what you buy, how you feel, and what you can do. Potential research questions were framed including:

- How does making affect you?
- Why do you like it?



- How has it changed you?
- Does it make you feel different?
- How do you share, online and offline?
- What skills have you learnt and how?

1.5 Synthesis of outward looking impacts

Outward looking impacts included all impacts on society more generally from making activities: such as evidence of people forging a career out of making, business start-ups, tackling social or environmental problems, contributing to community cohesion. Potential research questions were framed including:

- How does making relate to work or entrepreneurship?
- What difference does the availability of digital making technologies make?
- How does making affect environmental attitudes?
- Can making help solve local problems?

It was agreed to approach venues that could reasonably be expected to recruit participants with experience and knowledge that may encompass the broad scope of impacts, both inward and outward, that had been identified by the research team. Many of the potential questions for workshops that were brainstormed were found to be cross-cutting and relevant to both inward and outward impacts, such as the role of technology, sharing, connecting, and learning skills. The research team decided it was a good idea to broadly focus half of the workshops on 'inward' impacts and half on 'outward' impacts recognizing that many issues would inevitably be covered by all workshops.

1.6 Finding Workshop venues

Workshop venues and partners with as wide a geographical spread across the UK as practicable were considered. A brainstorming session within the planning workshop came up with a number of suggestions of organizations that were active in this field, such as makerspaces, collaborative work spaces, community-based environmental facilities, DiDIY-related University departments and so forth. Venues were suggested and considered on the basis that they had links to the DiDIY making agenda but could reasonably be expected to recruit among their own communities with assistance from the DiDIY research team.

The task called for 8 workshops and it was agreed to set-up 10, in as wide a variety of settings and venues as practicable, so that if one or two were not well-attended there was a sufficiently robust body of research data. The workshops were to be free to participants and additionally, to aid recruitment, free pizza and soft drinks were provided at a networking session beforehand.

47 organisations across the UK were identified and a database set-up to record and track contact with these organisations. 17 organisations were selected and approached to take part in the research. Work was undertaken to convert as many of these initial contacts as possible to actual workshop events, mainly through email contact. Venues were involved through a discussion of the aims and format of the workshops and dates, publicity, recruitment and so forth. The majority of venues that responded to the request to host a workshop were in the South-East of the UK, with 3 venues in London and 3 in or near Brighton, on the south coast of the UK. Two were outside the South-East, one in Bristol and one in Derby. Brighton was chosen as it was known to have a large active making community with several making venues, it was outside London, but within travelling distance on



the same day, and was a location where a member of the research team with local connections to the making community was based.

1.7 Advertising Workshops

Consistency of approach and in the workshop offer was provided by The DiDIY team. Support was offered to all venues in the form of:

- setting-up Eventbrite pages (allowing potential participants to sign-up) for each event;
- designing and providing publicity materials such as posters;
- developing a dedicated Facebook page;
- providing text and photographs for venue recruitment drives such as mail outs;
- Twitter and social media support such as tweeting and re-tweeting events;
- promoting events through blog posts such as <http://www.didiy.eu/blogs/does-making-matter> and events listings on the DiDIY website.



Figure 1 – Poster for a workshop at Build Brighton.



1.8 Participant recruitment

Host venues organized the time and date of workshops in a way that best suited their membership and maximized the potential for recruitment. Most workshops were scheduled for a Thursday evening slot and venues additionally promoted events through their own channels, emailing members or talking directly to potential participants, who were then directed to the relevant DiDIY Eventbrite page to register their attendance. Some venues chose a different approach; Bristol Pervasive Media Studio, for example, chose to incorporate the workshop as one of a series of existing ‘Open Friday’ lunchtime events and therefore did not ask participants to register and Derby Silk Mill invited participants directly. The workshops were in this sense co-produced with existing DiDIY and maker communities. Workshops with active Eventbrite listings were as follows:

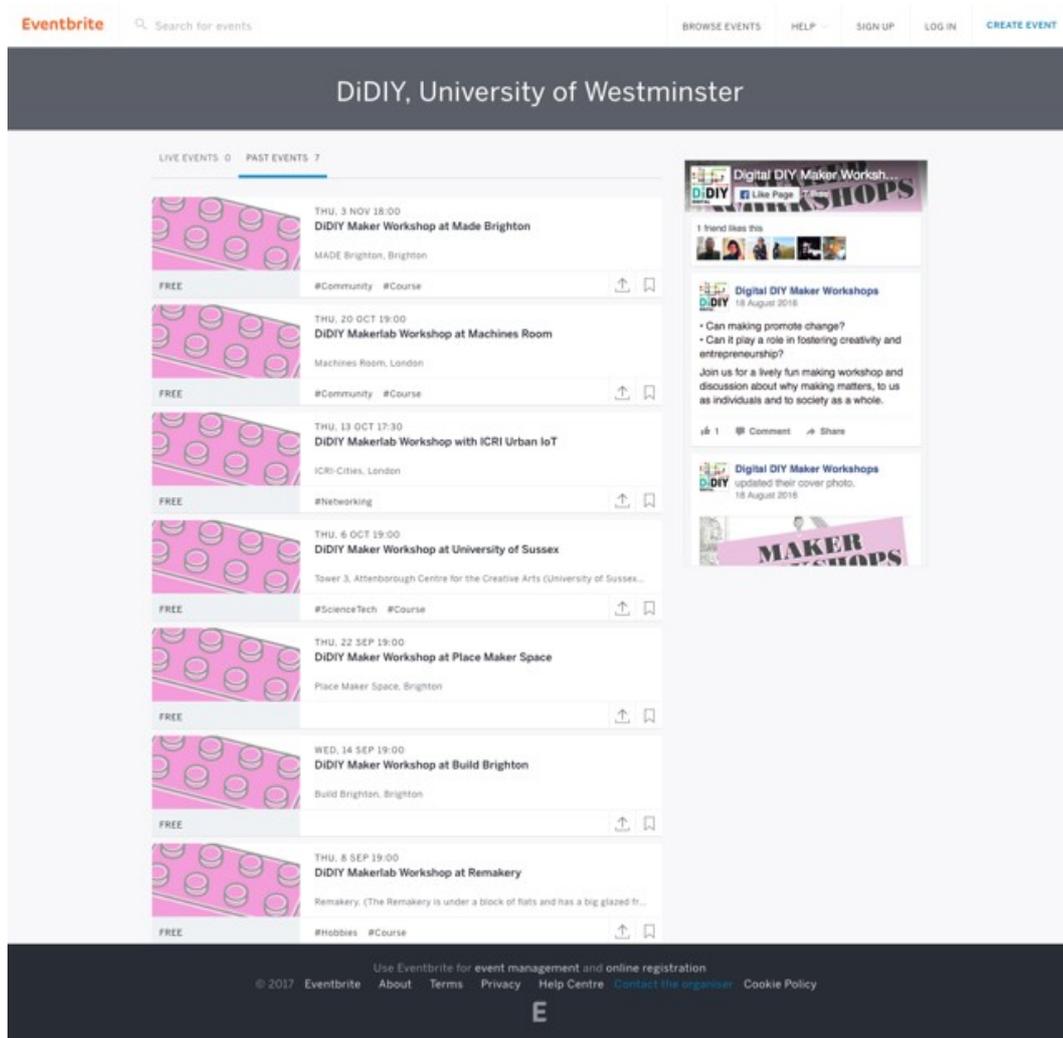


Figure 2 – Screenshot from Eventbrite DiDIY Makerlab listing summary.

It was agreed that a target participant number of 8 to 10 would be ideal for the workshop format envisaged. In all the Eventbrite listings the number of tickets was capped, initially at 14, but as it became apparent that it was commonplace for people to register but not actually attend the workshop, the limit for tickets was increased to 20. In almost all cases the tickets were all taken



before the event, however generally just over half the registered attendees actually came. The average number, among the 8 workshops that developed as well attended events, was 11, ranging from 7 participants at the smallest workshop (MADE, Brighton) to 21 at the largest (Bristol PMS). There were 95 participants who completed consent forms and questionnaires in total.

Two extra workshops that were set-up did not fully materialize, one was cancelled by the DiDIY team prior to the event as it had not attracted enough Eventbrite registered participants (Making Lewes), another attracted only 6 sign-ups but did go ahead on the day with 2 participants (ICRI). The success of recruitment was noted to be, to some extent, dependent on the extent to which the venue was able to actively recruit for the event. For example, recruitment was stronger where well-established venues with existing communication channels made repeated active approaches to a broad-based making community or membership, for example through their website, Facebook, and Twitter feeds. The DiDIY team is extremely grateful to all the venues that participated and promoted these workshops. And, of course, to participants for generously giving up their time and sharing their views.

1.9 List of Makerlab Workshops

The full list of dates and venues, with links to the venue website for more information, are as follows:

- Remakery (<http://remakery.org>): 8.9.2016 (9 participants)
- Build Brighton (<http://buildbrighton.com>): 14.9.2016 (12 participants)
- Place Maker Space (<http://arts.brighton.ac.uk/study/design-craft/events/place-maker-space-at-preston-barrack>): 22.9.2016 (10 participants)
- Bristol Watershed Pervasive Media Studio (<http://www.watershed.co.uk/studio>): 23.9.2016 (21 participants)
- Derby Silk Mill Museum of Making (<https://www.derbymuseums.org/locations/silk-mill>): 29.9.2016 (14 participants)
- Making Lewes Festival (<https://makinglewes.org/2016/08/30/making-digital-craft>): 1.10.2016 (cancelled prior to event)
- University of Sussex, Music Informatics and Performance Technologies Lab (<http://miptl.org/site>): 6.10.2016 (10 participants)
- ICRI Innovation Centre (<http://cities.io>): 13.10.2016 (2 participants)
- Machines Room (<http://machinesroom.org>): 20.10.2016 (10 participants)
- MADE Brighton (<https://www.madebrighton.com>): 3.11.2016 (7 participants)

Venues were chosen to try and ensure a wide range of participants that might have engagement with both inward and outward facing impacts. For example, two venues were identified with a more specific environmental and local focus (Remakery and Place Maker Space), one with a more collaborative work and small business focus (Bristol Watershed), one workshop was arranged to specifically target Etsy sellers and was advertised via an Etsy seller Facebook group (MADE), and another was aimed at a more technology-based research group (University of Sussex). It was found that participants came from a wide range of making backgrounds, in some cases all participants were closely associated with the venue, but in others a number of participants had not previously been to the venue, deciding to take part because they had seen the listing or poster independently and were interested in the subject or had received the invitation indirectly.

The questions included in the advertising copy for each event were tweaked to try and attract makers with a range of interests. Among questions used at different events were:



- Does making matter?
- Can making promote change?
- Can it play a role in fostering creativity and entrepreneurship?
- Can making solve problems with waste or the environment?
- How can people use makerspaces for local community needs?
- Does making just make you feel good?
- Can making support the local economy?

The standard invitation copy read:

‘Join us for an active and fun making workshop where you will get to use LEGO and other simple materials to make some things, discuss your making practice, and share ideas and experiences in the company of other makers.’

The gender representation within workshops was fairly even with 52 women and 43 men taking part. Age data was not formally collected but participants were noted to appear to be from a wide age range, the majority estimated to be between 25-45. Venues were told that the workshops were aimed at adult participation and no children or under-18s were included in the research, although on one occasion a participant was accompanied by their child, who took part.

2. Format of the Workshops

The WP5 Leader, David Gauntlett has more than 10 years of experience with LEGO Serious Play, a LEGO consultancy service. Within LEGO Serious Play workshops, adult participants are encouraged to build models in metaphors using LEGO and then discuss the objects created. Extensive research has found this to be a powerful way to enable people to externalize and discuss issues and feelings, and to connect with each other, sharing and exchanging ideas (e.g., Gauntlett, 2007). The essence of this approach was adapted for the Makerlab workshops.

Simple and colourful making materials were provided for each workshop including LEGO, buttons, bells, plasticine, pipe-cleaners, Play-Doh, wool, ribbons, sparkly tape, scissors, pens and paper. Each workshop began with an introduction explaining the DiDIY Project, the aims of the workshop and an introduction to the researchers. At each workshop a request was made for consent to take photographs and to audio record discussions. Participants were asked to sign a consent form designed for the workshop and were informed that any quotes used in research would be anonymised. Audio recordings were made totalling around 20 hours. Across all the workshops, in excess of 350 photographs were taken.

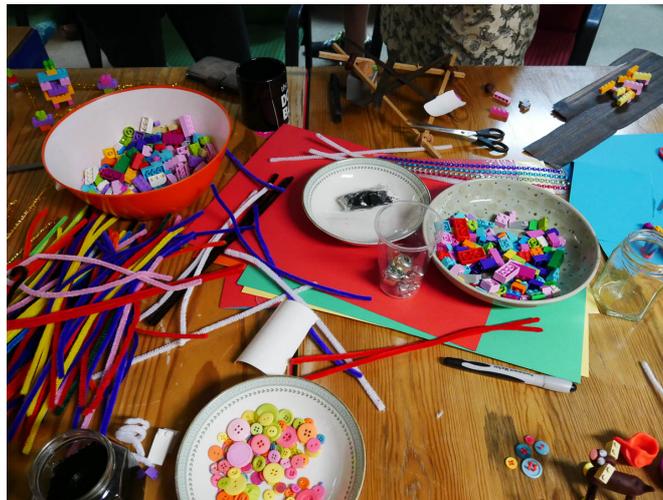


Figure 3 – Makerlab workshop materials.

Typically, workshops lasted just under two hours, from 7.00 to 8.45pm. Depending on the number of participants present, makers would work in one group (3 workshops) or be split into 2 or more smaller groups. In one case there were 4 groups of around 6 participants (Bristol Watershed). In all cases 2, and most often 3, facilitators from the University of Westminster were present.

The principal workshop facilitator (David Gauntlett) led participants through a series of repeated opportunities for making in response to an instruction. Generally, there were four stages to each workshop. Each making session lasted for around 5-8 minutes, followed by a longer period in which participants, taking turns, talked within their group and explained what they had made and why, briefly answering questions from the facilitators or other participants and entering into a group discussion. The instructions and format were discussed by the research team between events to enable adaption and improvement.

2.1 Stage 1. You and your Creative Practice

The first instruction led participants into making an initial model, as a metaphor, to represent or describe in some way their own creative practice. The facilitator typically asked participants to make something, with the materials set-out, that represents “the creative thing you like to do and how you feel when you are doing it”, and further explained as “relating to the key creative thing you do in your everyday making activities”.

2.2 Stage 2. Relate it to the World

In the second round, participants would be asked to “take what you have done and show how it connects to things or people in the world”. Further explanation by the facilitator typically added the suggestion that these connections or impacts could be positive or negative. “What are the things in the world that your making connects with – these could be positive or negative things or impacts”. Wording was sometimes slightly changed in order to draw out aspects particularly relevant to venues, such as local concerns and environmental issues by mentioning, for example, “through the environment or local area” among a list of possible ways that an individual’s creative practice could relate to the world. A second discussion would then take place.



2.3 Stage 3. The Digital

In the third round participants were invited to focus on the digital aspects of their practice. “Can you show what role the digital plays in this – often in today’s world there is some kind of digital connection, for example, there may be elements such as the internet, social media, digital production or electronics”. Participants were, in this way, asked to consider and discuss the significance of the digital in their making practice.

2.4 Stage 4. Collective Vision

In the final round participants were asked to negotiate with each other “to come up with a shared story or at least something with shared elements by taking certain parts from different people and creating something in the middle of the table that brings together different points people have made” or to “create some kind of collective vision for this table”. Participants had to negotiate and self-organise to agree an overall narrative. This was then reported back to all participants who joined together for a final “show and tell”, generally with one representative from each group explaining the journey the group had taken, as represented by their final collaborative creation.



Figure 4 – Makerlab: working together on the final stage.

All workshops were lively and engaging events, intended to be an interesting experience for participants, as well as providing research data. A feedback questionnaire was handed out at the end of the workshops and individual consent forms were completed by 95 participants in total. Comments on the workshops themselves were overwhelmingly very positive, with many participants reporting that it had been ‘fun’ and ‘interesting’. Makers, perhaps unsurprisingly, proved to be very adept at making their views and feelings visible in the shape of tangible objects. The format of the workshop enabled lively conversation. As one participant commented “What I enjoyed about the workshop was how the making connected us and started conversations. I think tactile making stimulated this”.



3. Types of Creative Practice

Participants talked about a wide range of creative practices. For some, the creative practice they chose to share was drawing or music making, some mentioned more formal craft practice such as jewellery making, furniture making or textiles, others had creative practices that incorporated electronics or digital fabrication technologies such as laser cutting and 3D printing. Creative practices involving elements of coding and computing were also common. Many participants described making undertaken as part of their professional life, or undertaken within communal making spaces but sometimes making was a purely private hobby or interest.

The type of creative practice undertaken could be any type of physical or digital practice, and commonly it was a mixture of both. Participants often expressed a preference for working in a particular way, saying “I like working with” followed by one particular type of media, material, or process, for example working with bright colours or reclaimed materials. Making was strongly associated with personal preferences and interests and no overall pattern to the creative practices described was apparent, other than it was generally described as a positive part of participant’s lives, although sometimes also a source of frustration.

Creative practice was very broadly interpreted and DiDIY was not seen as a separate category, although the research data that emerged, and is explained below, demonstrates that participants readily acknowledged that there was a new enabling infrastructure brought about through online creative platforms, access to local making facilities and low cost digital technologies, which had opened-up new opportunities on a personal and collective level.

4. Results

4.1 You and your creative practice

Analysis of audio recordings revealed the extraordinary breadth of creative practice descriptions. A huge variety of initial models were made by participants to represent their practice and feelings about it. Sometimes people began by making a figure to represent themselves, sometimes they made an animal or sea creature as a metaphor for their practice, sometimes they made an object such as a ‘heart’, ‘a bridge’ or a ‘building’ or a more literal model that represented some part of their work. Colours were often used to suggest concerns or moods, such as seeing the world through green ‘environmental’ glasses or using bright colours for happiness. Makers generally chose to talk both about specific creative practices and about the feelings, both good and bad, that making gave rise to.

4.2 Relate it to the world

In relating their practice to the world, makers discussed a wide range of ways that their practice was connected or shared with others, offline and online. Makers often expressed the universality of making, for example one participant expressed the view that creativity is ‘in our DNA’ and it was common for participants to feel that ‘everyone can make’ and that humans like to connect and solve problems. Makers generally had no difficulty in explaining how their practice connected to other makers and to the world, although a few expressed a preference for solitary practice, connected only through gaining inspiration and knowledge via digital means, or selling to customers over the internet.

4.3 The digital

Digital knowledge, imagery, data, tools and connectivity were all celebrated in different ways. Makers sometimes expressed some ambivalence about the digital, particularly the pressure to



engage in social media and ‘share everything’ which was occasionally seen as a nuisance. Often a preliminary discussion of the digital had already been started because discussions of practice in the previous stage, and how it related to the world, often touched on the digital.

4.4 Collective vision

The collective visions were generally surprisingly easy to articulate. There were often many points of common interest among the participants, despite the fact that they were, in the main, strangers who had not met before the workshop, and they had a very wide range of creative practices. Most groups were able to put together a coherent narrative and often the stories of what had been discussed by the table as a whole highlighted making in a context of digital connectivity and community, on two occasions with a Utopian character, where making was a source of community and environmental solutions to problems and a better future. Only one of the workshops resisted the invitation to tell an overall narrative. In this case participants felt it made more sense to leave their work as a group of distinct ideas and feelings.

The following 14 sections of this deliverable describe objects created and described within these workshops and explains how these metaphors relate to makers’ practice, motivations and the feelings about making that were expressed across the workshops as a whole. The explanations aim to draw out the way makers described their practice and some of the personal and societal impacts that participants expressed. Descriptions and quotes are all drawn from participants, although the titles have been created by researchers. Each characterization may incorporate more than one participant’s views and the commentary draws on comments made in more than one workshop. At the end of each section a number of related quotes are listed which have been taken from the participant questionnaire distributed at the end of each workshop. This asked “After your experience of this workshop in what ways do you think making could most benefit society?” An open text box was provided for a written answer. 93 out of 95 participants contributed comments.

5. Summary of makers’ views and models

- Everyday creativity: The Fish Thing
- Creative problem solving: The Question Mark
- Inspiration from the internet: The Idea Cloud
- Sharing content: The Remix Creature
- Collaboration, online and offline: The Giant Bridge
- Communities: The Village
- Making and change: The Ship
- Civic well-being: The Heart and Brain
- Flow: The Floating Kayak
- Confidence through skills: The Portable Armchair
- Consumer culture challenged: The Authentic Tree
- The circular economy: The Curious Bug
- Digital extension to practice: The Digital Superhero
- Digital ubiquity: The Connected Table



5.1 Everyday creativity: The Fish Thing



Figure 5 – The Fish Thing.

The Fish Thing is made out of most things on the table, as its maker explained it is all about “playing around” and “taking me out of my normal boundaries” and was especially made to be flamboyant in contrast to the commercially driven constraints of everyday work. The Fish Thing represents the overwhelming view of participants that the central benefit of making is creativity.

The opportunity to be creative through making was highly valued and often associated with a strong feeling of happiness. The physicality of making and materials was also celebrated with more than one participant commenting “Pushing the Play-Doh through the buttons is very satisfying”. For participants, making was “for everyone” and didn’t need to always be taken too seriously but had potentially widespread beneficial social impacts in spreading the joyful opportunity for creativity.

An association with childhood was common, with making seen as a way to regain playfulness and creativity that had been lost. As one participant commented “I used to do a lot of creative things when I was little but in High School I just stopped so when I got back into it that was great ... it’s de-stressing...I don’t think about anything else and its very nice”.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

“It’s a relaxing pastime for me and others. A meditative practice learnt in childhood.”

“Getting people in touch with their creativity which is perhaps a bit dormant when other aspects of life have taken over. Learning to lose the critical voice regarding what you can and can’t do, and enjoy making for the sake of it.”

“Spreading the happiness of the makers to all!”



5.2 Creative problem solving: The Question Mark

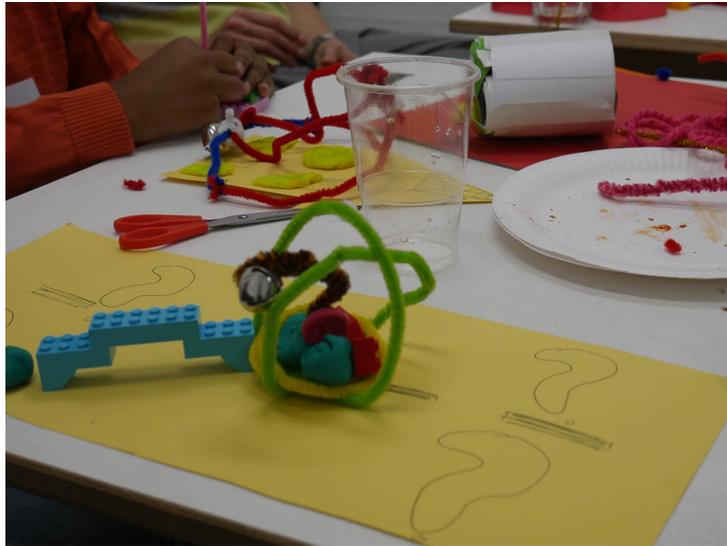


Figure 6 – The Question Mark.

The Question Mark is restlessly searching for solutions to problems and won't stop until it finds the answer. It is surrounded by other questions and explores possible pathways, including bridges to new information, to new equipment and processes and people who might be able to help. It is never sure how long a solution will take to find but tries things out, as several participants mentioned “by going round in loops”. It does its thinking through making. It has a bell that rings when it has a “eureka” moment and is always thinking about taking regular things and looking at them in a new way. It wants to know more about the world.

Many participants described their process as one of creative problem solving. In some cases, this was a continual quest, for example, some participants described how they might not always finish things but still felt they had accomplished something if they had made progress and might come back to problems later. Makers agreed that they accumulate “different bits of background experience and skills” that help to build making confidence, but many viewed making as a continual challenge, a source of both happiness but also difficulties, and the term “frustration” was often repeated. Makers had a positive attitude to making mistakes, as one mentioned “you accept failure and experimentation because ultimately you get something out of it”.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

“Via problem-solving, imagining and re-imagining and understanding materials, situations and opportunities. If we learn to play more we will see and understand how problems can be solved.”

“Making provides different points of view, alternatives and solutions to problems.”

“Making as a way of thinking, creatively.”



5.3 Inspiration from the internet: The Idea Cloud



Figure 7 – The Idea Cloud.

The Idea Cloud is raining down good ideas. You can drown in the rain from the idea cloud because there is so much rain that you can't see properly. It can be very inspiring but also confusing and over complicated. Sometimes it rains upwards to the idea cloud, you move through taking the idea down to earth and, as its maker described, "following a rhythm in which you look at other people's ideas and then you start to prototype and end up with your own thing, that you can then share. An idea that started out as something you were drowning in may end up as something you can sell, something that has changed your practice or you have shared around the world". This dynamic of creativity and sharing was described a number of times in workshops.

The role of online platforms in providing inspiration was seen as vital, as one participant commented "most of my ideas come from seeing something online and thinking that's a really cool technique or that's a really nice design and thinking what I could do with that...".

But the sheer volume of material online was commonly seen as potentially overwhelming and a source of time wasting, another maker explained "I can be looking at something on Pinterest and go down a horrible wormhole and lose 3 hours...or I could get inspired and start making...so it's both good and bad". Serendipity in finding creative inspiration online was praised "you start off looking for a sheep and end up finding a pom-pom in the shape of a flower". There was plenty of criticism of the internet and social media too "it's really difficult to filter out all the irrelevant stuff... I don't have time for that". And some people just wanted to make for themselves and share images with a much smaller family group.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

"Share ideas and spread ideas."

"Inspire more thoughtfulness into ideas one might be struggling with by re-imagining the problem."



5.4 Sharing digital content: The Remix Creature



Figure 8 – The Remix Creature.

The Remix creature is a digital native. It is made up of previously existing digital data that can be changed and added to, so that “sometimes even when it is done you don’t know the meaning until you leave it for a while”. The remix creature can change shape and can be added to by the community once it is shared. Already the fact that it has been shared digitally on a phone is giving it new tones and colours and opening new options. By using and re-using existing content the remix creature’s current maker can focus on “the idea I want to share”.

The ease of digital duplication and the role of digital data that acts as content for some makers (rather than as an inspiring starting point) was apparent. In some media makers were drawing on a relatively long history of digital sharing and remixing (for example music and design) but in others, such as physical making, the sharing of open source projects, and digital designs was relatively new. Maker spaces with digital fabrication equipment are able to collaborate on projects across wide geographical distances. As one participant commented “we are able to share business models or best practice with a maker space in Shenzhen or Boston” via the internet and, for example, this had resulted in bringing together a tight community over several months to develop a plastic recycling project, with plans for plastic recycling equipment shared and improved globally, they concluded that “none of that would have happened without the internet”.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

“Sharing of ideas and open sourcing can greatly benefit society, there may be great discoveries to be made if people collaborate.”

“By allowing people to share their ideas; a process that could be a real benefit as it could bring together a world-changing idea with the person who has the means and finances to make it a reality.”



5.5 Collaboration, online and offline: The Giant Bridge



Figure 9 – The Giant Bridge.

The Giant Bridge is about well-founded collaborations online or offline. The bridge has “giant shoulders because you are really building on what other people have done” and has space to add to it yourself. Other people are free to do what they want with anything left on the bridge. The bridge is a place to go for open source knowledge and learning new skills. It also provides a way to move towards solutions, making connections to other makers and to a community. Bridges were made several times in workshops and they could also represent other types of connection, such as bringing together ideas and the physicality of making.

Collaboration took many different forms and often had digital and physical elements.

Participants regularly extolled the virtues of YouTube, and forums and tutorials to learn about specific aspects of making. For example, one participant commented “there is such a great culture of people helping with specific problems ... you can very quickly piggy-back on the work that someone else has done.” Another said “You’ve got a huge library and it’s all free” but it was still necessary to work through the issues and problems yourself. “You can’t just blindly copy, you’ve got to understand it to make it work but it saves a lot of time”. Another commented that makers needed to develop “a new form of literacy” in order to be able to distinguish good advice from bad.

It was common to get inspiration or information online but move forward through real life contacts and specialist help, and maker spaces were seen as particularly valuable as a source of help and collaboration. “Being in spaces like this is just so useful...there’s a real mix of people...someone will come in and start doing something you’ve never seen before on the laser cutter or 3D printer or with a new material.... I could work from home but I find it so useful to be here when other people are here”.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

“Build teamwork, friendships, share ideas and practices among creative professionals, make you see things in a different light.”

“Collaboration can create inventive solutions.”

“Making is a personal and interpersonal thing – working together is a way for individuals to develop a common language and shared experience. It is also fun.”



5.6 Communities: The Village



Figure 10 – The Village.

The Village is home to lots of different people and works through “multi-disciplinary teams” “conversations” and by pooling existing knowledge and skills. In the village you learn by “having a conversation about it”. It’s a way of life that doesn’t stop and people work to overcome barriers by incrementally improving outcomes. Everyone is needed because there are “lots of problems out there” but things are constantly evolving and changing. More than one workshop developed a narrative about “a village” where communities of makers met challenges, one participant for example described this as a place where in “a safe environment” makers felt comfortable in taking the next step.

The community that participants identified with could be a “network of specialists” or “a community of amateur makers”. One advantage of community was seen as learning along with others and finding comfort in the idea that projects in process are shared within a supportive community and things don’t have to be “perfect products”. The motivations for making connections and working as part of a community varied; some wanted to make face-to-face social connections in the “real” world, and to work on projects offline and be less reliant on sitting down at a table and watching a screen. Typically, community was mentioned in terms of both online and offline communities, for example in terms of community-making facilities not previously available and the new making possibilities this opened-up.

The universality of making, the sense in which it brings people together and bridges the digital and physical and can be inter-generational, was seen as providing a basis for making having social impact in terms of community cohesion and for local problem solving.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

“Creating the means for society and communities to do more for themselves and build knowledge and skills and networks.”

“Improves and creates communities, promotes working towards shared common goals. What we make can be innovative, beautiful and useful.”

“Community cohesion- Creating changes in communities through making. Bringing people from different cultures and work experience together to share ideas. Helps to break down barriers- It’s great!”



5.7 Making and change: The Ship



Figure 11 – The Ship.

The Ship is on a journey. Setting out without knowing the destination and happy to take wrong turns and explore. The relationship between making and change, on both a personal and a social level, was very strong and often expressed by participants as making having taken them “on a journey”. Sometimes this was an entrepreneurial venture, new business or work that had been enabled through making, sometimes the journey was more about “finding a balance” and sense of relief from everyday pressures through creative practice.

Several participants talked about new employment opportunities through making and online ventures. One participant, for example, explained he was now “more or less manufacturing on a small scale” selling online to buyers and found that “the best part of it is hearing back from people and hearing other people’s ideas”. Another participant explained “what I am doing now just wouldn’t have been possible 10 years ago...because of new technologies now and programmes being available for free on the internet, that has really opened up this opportunity for me.” But some felt that the need for digital marketing and internet connectivity was a burden, for example, one commented, “It takes such a long time to get good at putting your work online and this distracts from the work itself ... I find it boring”.

The sense in which making gave people a pathway towards change, in many different areas of life but particularly through digital capabilities, was one of the most commonly cited benefits.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

“The link between making and change MUST be valued, everybody has some inbuilt creative characteristic.”

“Making gives back the power to the regular person, gives them the freedom to change and improve their environment.”

“Making fosters creativity and that’s good for the economy.”

“Making is a practice which leads to mental and physical development – it motivates change.”



5.8. Civic well-being: The Heart and Brain

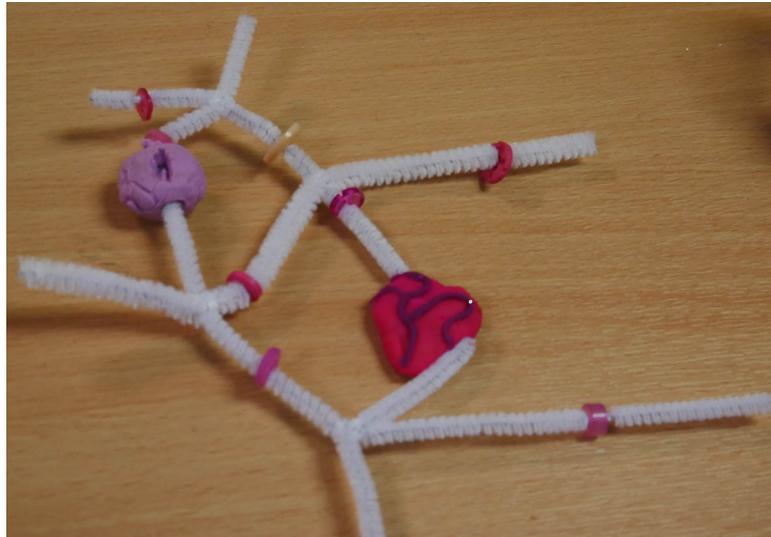


Figure 12 – The Heart and Brain.

The Heart and Brain are interconnected and are working to promote understanding and care for groups of people. The heart and brain are integrated within one system bringing together ideas and the engagement, through the physicality of making. There was a lot of discussion in workshops about the ways in which making as an activity could be used as a tool to promote well-being.

Making was seen as good for people from many perspectives, from the idea that having “objects made with love and care” around us could increase our vitality, to providing a “balance” to life, to spreading “positivity and happiness through a chain reaction”. Typically, makers reported experiencing “joy” or a sense of “freedom”, “fun” or “exploration” and wanted to spread that experience to others. One participant commented that’s she felt “The feeling of making is a place of comfortable warmth and reflection, with no noise where you can do whatever you want”.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

“Society I think is full of negative aspects. Making can provide a lot of positivity around us. Which I think is very important for every individual.”

“Promoting a sense of empathy and community.”

“Help them therapeutically connect with issues, problems and people. Physically creating something.”

“I think making can be very good for people’s mental health and well-being.”

“Bring positive changes to negative situations- for example, unhappiness, stress, boredom.”



5.9 Flow: The Floating Kayak



Figure 13 – The Floating Kayak.

Having paddled hard to get to where it wants to be, the Kayak is now on a really calm still lake and is just floating along. It describes for its maker the feeling during making “when you just get completely absorbed in the moment and you just drift along in the space that you’ve made... that is the most fun bit” it is all about “flow” and being lost in the moment of making. The specific idea of being absorbed in making and able to switch off from the outside world and other distractions was mentioned several times by a number of participants.

The concept of ‘flow’ is one that has been the subject of research in many academic fields (Csikszentmihalyi, 1992) and is a well-known theory within design, management, the psychology of happiness, and elsewhere. A number of our participants described concentrating on the task at hand and forgetting the outside world. Some, for example explained how they get a lot of enjoyment from pursuing a challenging making goal for its own sake. Other participants described a number of benefits they experienced from this single-minded approach to making tasks. For example, one said “making makes me feel calm and like I am in control and getting everything organized” another that “Concentration pushes all the worries and anxieties away” and a third “I like the focus that I get when I make very delicate things”.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

“Making can have therapeutic uses. It can help people reduce stress.”

“It clears the mind, like a meditation.”

“By allowing them to achieve happiness and flow state as an antidote to the stress of modern day living.”

“I think in our group a common theme was that making was a way we all relaxed (especially in how it related to our childhoods). Bearing that in mind, I think it can be used as a great tool for relaxation.”



5.10 Confidence through skills: The Portable Armchair



Figure 14 – The Portable Armchair.

The Portable Armchair has wheels and is both comfortable and confident because it has a golden skill that it carries around. Its golden skill makes it feel more useful, confident and interesting to the other armchairs it meets. Its maker explained that “having a skill that you carry within you ... gives you a stature within yourself... it’s like portable self-esteem” and can be a gateway socially.

The way in which once you have a skill it becomes part of your identity as a maker was celebrated by a number of participants. The acquiring of skill was seen as an end in itself, performing making activities in a skillful way was highly valued, but skills were also seen as a route to improvement. One maker said there is a “tangible sense of you improving yourself” another said that acquiring a skill “gives you a way of understanding yourself and your ability to grow”.

Building confidence more generally through social interaction and the sense of achievement at having accomplished a making task is a key personal benefit reported by these participants.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

“Making gives people a sense of self-worth and a tangible way to contribute. I love being creative and making helps me put that into practice. Not being afraid to make can lead to innovative ideas and solutions.”

“It makes people happy. It gives them skills, and it gives them a challenge.”

“Empowering people to be more independent and engage with systems affecting their lives (technical, production and social). To encourage lifelong learning and grow confidence in doing new things.”

“Giving people self-confidence in making skills.”



5.11 Consumer culture challenged: The Authentic Tree



Figure 15 – The Authentic Tree.

The Authentic Tree expressed the sense in which if you had made something yourself you knew where it had come from felt more engaged with it, and had a different relationship with it. Dissatisfaction was voiced by the maker of the authentic tree with the “simulacra” of manufactured goods made to look or sound like they were natural but which were “cloaked in a fake nature”. This participant felt that because consumers were uncomfortable with being distant from the source material of manufacture, producers tended to give products a veneer of “nature” to make them more attractive but that actually making things yourself was more satisfying.

The extent to which making was a challenge to consumer culture was discussed in a number of ways. One participant said “I value it more if I’ve made it myself” another explained the satisfaction gained from having made several pieces of furniture including a desk, a coffee table and shelf from the wood recycled from a bed no longer needed, commenting that “sometimes it’s good to have constraints because it gets you focused”. Being able to choose to make items themselves and the validation from selling hand-made items, making a connection to an individual customer, were seen as benefits.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

“Making gives meaning to buying.”

“If more people learnt to make things then more would realise that it’s not easy to do well and that might mean that ‘makers’ aren’t so financially undervalued in society.”

“By encouraging DIY practices instead of consumer culture.”

“Making is profound ownership. You only truly own the things you make.”

“Making allows us to reconnect with objects and better value them.”



5.12 The circular economy: The Curious Bug

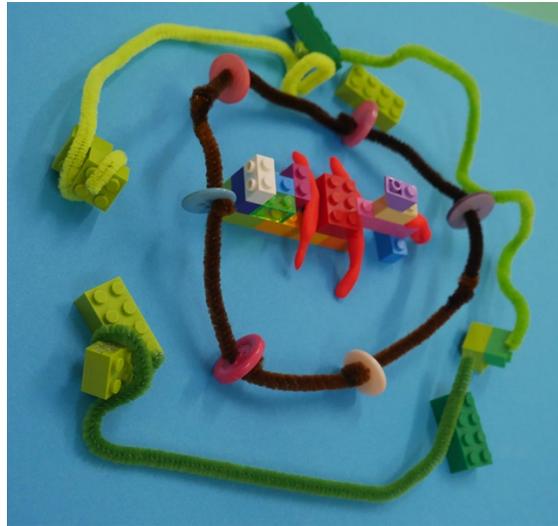


Figure 16 – The Curious Bug.

The Curious Bug has big eyes and is always looking around and investigating. The Bug loves materials and “drags a whole lot of gubbins around”. She is not constrained by what is provided and seeks out solutions and materials, old and new. The Curious Bug collects materials but is not a hoarder, she likes to sort materials and re-use them. The bug likes to use what is around her, to take one thing and transform it, to make something else out of it, using waste and found materials to make something useful. But the Bug knows she works on the edges of a much bigger system of production and waste and may only be delaying the disposal of the materials she re-uses.

Makers sometimes started with an existing object or material as the initial inspiration, “an excuse to make” and there was a lot of interest in re-use, re-cycling and up-cycling objects and materials. Making was seen as a way to “bring forward ideas that have worked in the past” and find “new ideas” for the future. One participant, for example, was making a coffee table out of palette wood and was pleased to be able to use free materials but felt “It’s just one palette out of a million so it’s not making that much of a difference”. Another participant had developed a textile pattern cutting programme to reduce material waste. Awareness of the need to use materials efficiently, and more general environmental concerns, appeared to be very strong. Some makers took pride in using what’s at hand to find new solutions.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

“Knowing how to fix things makes local recycling better.”

“It could really help combat a lot of the challenges facing us if allowed to happen. People need the space, resources, and confidence to make things, however, lots of people never get a chance, never play, which is a shame.”

“Circular economy – re-use and more efficient use of resources.”



5.13 Digital extension to practice: The Digital Superhero



Figure 17 – The Digital Superhero.

The Digital Superhero has digital limbs and can reach out and interact with the world in ways that are not possible for an ordinary human being. The maker of the digital superhero saw digital capabilities as purely positive, an extension of themselves and their making and commented that for them “code as a notational language is something you can express yourself with and not just something you look at on a screen, but can be embodied as something that you feel or listen to”. Another participant also made a figure with an artificial arm which is “the most amazing workshop tool that will make me the perfect craftsman and maker of things” and enable them to reach all sorts of new and interesting tools. They admitted to being fascinated by technology but were wary of being seduced by it.

The idea that technology, and particularly digital technologies, extended creative practice was very common. The current prevalence of the screen as a digital mediating device was seen as a problem but one that was beginning to change as we develop smaller and more flexible digital technologies that are embedded in materials and objects. It was suggested by one participant that younger generations didn’t preference the digital, for example being excited by vinyl, and see the digital and physical as a continuum and continually interchangeable.

Digital technology allows for more influences and to gain help from more sources, in one case “allowing me to do things I would never even have attempted before” but physical distance was seen as a problem “when you are actually doing something, having someone actually there who really knows their stuff is worlds apart...so that’s a loss”.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

“Making new tools that encourage creativity in a more intuitive way. Tools that feel analogue even if they are digital. Creativity should be a source of happiness for people, not a frustration.”

“We kept returning to the discussion and problems based around when screen-based technology can be a barrier to people connecting with each other.”



5.14 Digital ubiquity: The Connected Table



Figure 18 – The Connected Table.

On the Connected Table all the materials come to life to physically connect all the people at the table together. It is “all about making connections and being aware of when a connection is made”. Everyone at the table eventually becomes “inter-connected because we have shared multiple layers of our stories... and are now no longer individual beings”. There was some debate about whether this level of connectedness helped or hindered progress, some people feeling just “tied-up” and that this over-connectedness meant we are “all moving in the same way” for others “connectedness” was a positive and made them able to move forward together.

Digital technology was often framed as ambivalent, and feelings about it described as “mixed”, from the idea that social media is “robbing us of lots of time when we could be doing something more useful” to a model that showed “a machine taking over what used to be man’s job harvesting stuff” to an “all-seeing eye”. Commonly it was seen as both an opportunity and a threat one participant commented “people from different cultures are able to share but then they might lose individual cultural character” and the sheer scale of digital connectivity was occasionally seen as overwhelming another said of their model “it was connecting things to new things but then it all became a bit chaotic and suddenly it was a block and I felt hemmed-in by the internet”.

Questionnaire Responses: After your experience of this workshop in what ways do you think making could most benefit society?

“Making connects people. They are not hiding in their own worlds, and can meet other creatives. During “making” something new can be developed. And it’s fun.”

“Making can connect people and encourages people to share, be open.”

“I think it’s a good way to share parts of ourselves in a way for others, who may be very different from us. Humans want to be creative and it’s the glue that holds society together.”



6. *Makerlab Workshops conclusion*

This part of the deliverable has presented the results of a series of workshops held among creative practitioners who responded to an invitation for ‘makers’ to explore whether making matters. Their conclusion is that it matters to them very much. The evidence is limited, of course, to makers motivated to attend a workshop and the research confirms that for these makers their creative practice is a source of enormous benefit in their lives and creates a wide range of personal impacts.

Creativity is celebrated for its own sake and creative making is clearly identified as an activity that is fun, enjoyable, de-stressing and a source of joy. As a creative mindset, many participants reported going through an iterative process of creative problem-solving built on an attitude of curiosity and the acquisition of skills, experience and know-how. A distinction can be made between times when making was being undertaken for fun and enjoyment (the Fish Thing) to making as a more serious, sometimes frustrating, but ultimately satisfying creative process (the Question Mark), but many makers undertook both types of making at different times. The kinds of personal impacts and benefits reported included a growth in self confidence and self-esteem and social connectedness (the Portable Armchair), and a sense of happiness from the total absorption in the task (the Floating Kayak).

The personal impacts add-up to important social impacts when making is undertaken by a wide section of society, as it probably already is, in the sense of everyday making from gardening, to cooking and craft. What is relatively new about the social impact of making is the digital context of practice. These participants explained in detail how digital affordances interacted with their practice. The dynamic between creativity and sharing, how they reinforce each other and how this is magnified by global connectivity is illustrated.

Participants explained the role of the internet in finding inspiration (the Idea Cloud), the role of digital data in providing content and new possibilities for practice (the Remix creature) and the role of digital communication and online platforms in connecting communities, providing support and learning and forging collaborations (the Bridge). Collaborative value chains enabled by digital technologies support a new creative paradigm for DiDIY. Although the significance of the digital was huge and generally seen as an extension to practice (the Digital Superhero), there was also some disquiet about the extent of connectedness (the Connected Table) and the pressure to share.

The dynamic of creativity and sharing that connects making communities (the Village) was also seen as a potential source of wider social impacts. From a recognition that making was a pathway to change and embodied an entrepreneurial spirit (the Ship), to the potential for an alternative to buying things, thus challenging consumer culture (the Authentic Tree) to impacts on the re-use and recycling of materials (the Curious Bug). Finally, making was identified as a potential tool for building community cohesion and well-being (the Heart and Brain).

The sense in which DiDIY could enable communities to come together and develop local solutions to problems, combining local expertise and making facilities, with global knowledge and best practice, was clearly expressed by participants in their written answers to the question ‘In what ways do you think making could most benefit society?’. DiDIY is still in its infancy and it appears that these views are currently running ahead of any widespread practice. However, small-scale, bit-by-bit change was apparent both in the creative practice of makers and in their aspirations.

As one participant commented: “It could really help combat a lot of the challenges facing us if allowed to happen. People need the space, resources, and confidence to make things, however, lots of people never get a chance, never play, which is a shame”.



Part B: Spark Workshops

7. Background

The second series of workshops were promoted as “Spark” workshops. The 6 Spark pop-up creativity workshops were held in public libraries. In these workshops members of the public used digital tools, including littleBITS (<http://littlebits.cc>) electronics, to take part in a team design and invention challenge, working together to design and prototype objects from ideas they had generated in the workshop. The research data collected explores their experience and views, for example, regarding creative engagement and the potential for making in public libraries.

7.1 The Task

The Spark series of workshops was undertaken to meet the requirement of Task 5.3 in the DiDIY Grant Agreement which states:

Task 5.3. Pop up design workshops (M18-M26) (Leader: UoW)

To generate answer[s] to the five research questions related to this WP, we will organize workshops open to the public in 6 public libraries, where visitors will be able to try out a range of tools whilst discussing their attitudes to everyday creativity and its relationship to social life.

7.2 Workshop planning

Task 5.3 calls for workshops open to the public in public libraries. After researching existing provision, it was decided, early in the planning process, to work in association with MakerCart (<http://makercart.org.uk>), who have experience organizing and running pop-up makerspaces for schools, libraries and community centres. MakerCart have developed, and make use of, a mobile makerspace facility including 3D printing, digital cutting, electronics, micro controllers and robots. MakerCart workshops aim to introduce participants, in a hands-on way, to this range of digital technologies. They also make available a small library of books and information regarding making and the maker movement.

For this task the research team, in association with MakerCart, developed and commissioned a series of creative design challenge workshops in public libraries aimed at introducing members of the general public to DiDIY technologies and at exploring their views regarding the suitability of libraries as sites for digital making.

7.3 Workshop format

A workshop planning meeting was held in May 2016. It was agreed that an active making workshop engaging the participants in a design challenge would be an appropriate research tool and that workshops, ideally, should have enough participants for two teams to work in parallel. The workshops were designed to last for two hours in order to give participants enough time to be fully engaged in the design task. It was felt that under 18s were more likely to be readily receptive to creativity with digital technologies and, after some discussion, it was decided to specifically target the more challenging group, and make the workshops open to over 18s only. It was agreed that two workshops in three public libraries would be organized, making a total of six workshops.

Workshops were planned as advertised and ticketed events, and it was agreed that the ideal number of participants would be 8-10, with a ratio of facilitators to participants of at least 1 to 5. It was decided to make the workshops free to participants. A consent form and a questionnaire for



participants was developed. Data collection was carried out through audio recording and photography and via a questionnaire completed by each participant at the end of their workshop.

7.4 Finding library venues

A written proposal was developed to invite libraries to take part. This explained the research context and intended workshop format as follows:

Your library and your library members are invited to take part in a research project being carried out by the University of Westminster, in association with MakerCart. The aim of the research is to explore creativity in relation to the phenomenon known as Digital DIY (DiDIY). For us, the term DiDIY expresses how the growing accessibility of digital making technologies, alongside knowledge and data from the internet and online communities, are enabling new ways for people to make things and do things. Specifically, we want to run library workshops for up to 10 participants that will investigate creativity using DiDIY tools. We are seeking to understand how DiDIY creativity may be able to impact on wider creative society – for example, giving makers a sense of creative agency, or communities the resources to tackle local, social or environmental problems.

Workshop overview

The ‘Spark’ workshops are designed to encourage creativity using familiar materials and digital technology. They are aimed towards the general public (over 18s only) and previous knowledge of digital making/manufacturing is not required. They will take place in public libraries during the Summer 2016. We want to explore how participants can use Digital DIY tools in creative ways and we want to gather data about participants’ views of making and creativity.

During the workshops, participants will be introduced to making tools including 3D printing and littleBits electronics, other making resources, and a simplified version of design thinking. They will work in small groups of 3-5 people and be presented with a group challenge to ‘create something’ (for example working on an idea for something personal, something that solves a local problem, or something that is thought provoking). We will finish the workshop with a ‘show and tell’ to give participants the chance to explain their creation, talk about the process and challenges faced and gather feedback from the rest of the group, including how to improve their design.

The GOALS

1. Introduce participants to digital making/DIY.
2. Create something using design thinking and familiar objects, electronics and digital tools.
3. Evaluate how digital making tools and creativity can be combined to create something personal, solve local problems or express ideas.

7.5 Participating libraries

The three libraries that were recruited and ran Spark workshops were:

- Guildford Library (workshops held on 9.7.2016 and 6.8.2016)
- Leamington Spa Library (workshops held on 10.9.2016)
- Ilford Library (workshops held on 26.11.2016)



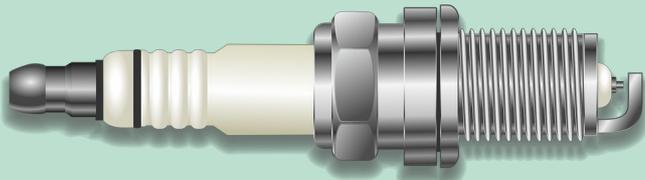
7.6 Advertising Workshops

Workshops were advertised in a variety of ways including posters displayed in libraries, through Eventbrite listings and through outreach by the libraries themselves. This generally included a mail-out to library members, social media campaigns, making use of library event listings and sometimes, additionally, a press release. The DiDIY team and MarkerCart supported marketing efforts, for example setting-up Eventbrite listings, designing and producing posters and through DiDIY Twitter posts, event listings and blog posts, for example: <http://www.didiy.eu/blogs/didiy-sparks-creativity>.

Digital DIY & Makercart

SPARK

Creativity Workshops



Would you like to 'have a go' at being creative?
Want to learn how you can use digital tools to
create something?

Register now at <http://bit.ly/28OnMcV>
(spaces are very limited)

Session 1: 10.30am to 12.30pm
Session 2: 2pm to 4pm
Register at <http://bit.ly/28OnMcV>
9th July 2016
Guildford Library
77 North St, Guildford GU1 4AL



SURREY



UNIVERSITY OF
WESTMINSTER



DiDIY
DIGITAL
DO IT YOURSELF



Maker
Cart

Figure 19 – Spark Workshop poster.

7.7 Participant recruitment

It was found that participant recruitment for these workshops was slower than for the Makerlab series of workshops. One reason may be that the workshops were all organized for Saturdays and, at 2 hours long, required more commitment of weekend time from participants. Unfamiliarity with



this kind of making activity in libraries may be another reason however, equally, other unknown causes may have contributed to difficulty in recruiting participants. As with the Makerlab workshops, it was common for participants to register but not attend. On two occasions a plan to run two workshops in one day (Guildford 9.7.2016 and Leamington Spa 10.9.2016), was revised and a single workshop with combined participant numbers went forward. In order to aid recruitment, the over 18 age limit was lowered to over 16 for the final workshop, and this workshop did attract a number of 16 and 17 year olds. The workshops that went forward had the following numbers of participants:

- Guildford 1: 9.7.2016 (10 participants) 1 workshop
- Guildford 2: 6.8.2016 (12 participants) 2 workshops
- Leamington Spa: 10.9.2016 (5 participants) 1 workshop
- Illford: 26.11.2016 (14 participants) 2 workshops

The workshops were planned, ideally, for 60 participants, however, 41 participants, in total, attended.

7.8 The Workshops

During the workshops participants were given an introduction to digital technologies, including a demonstration of 3D printing, and a chance to become familiar with an electronics system designed to aid prototyping and invention, littleBits (<http://littlebits.cc/>). The littleBits website describes the system as ‘easy-to-use electronic building blocks empowering everyone to create inventions, large and small’ (littleBits, 2017). LittleBits are colour-coded, magnetic, and reusable building blocks that allow users to easily combine complex elements to make prototypes, which may, for example, incorporate light, sound, and motion. A very wide range of littleBits components were available to workshop participants allowing them to combine inputs (e.g. switches or sensors) with power sources (e.g. batteries) and outputs (e.g. lights or motors). Every workshop had two experienced facilitators, as well as a workshop leader, who were familiar with the littleBits system. Other simple making materials such as card, pens and tape were also available.

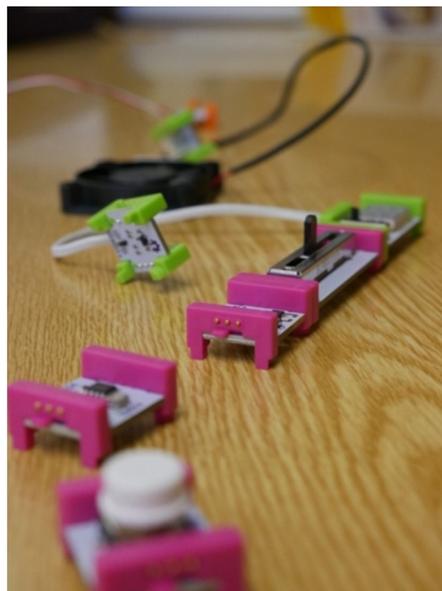


Figure 20 – LittleBits modules in use in the workshop.



Participants were divided into two teams and took part in a brainstorming exercise to come up with possible inventions that they would like to prototype. A very wide range of ideas was discussed across the workshops, the starting point was users' own experience and suggestions ranged from intruder alert systems to interactive garden tools and a 'robo-dog' mail delivery system. Participants were then directed to choose one idea per team, generally by voting on the available suggestions, and then encouraged to make an early prototype. Initially they discussed and described the features of the invention and made some drawings and plans, and then worked together to assemble a working prototype using littleBits and whatever other materials they needed that were to hand.

7.9 Summary of prototypes made

All of the teams were able to make a working prototype that they could show to the other team by the end of the workshop. The inventions showcased included, for example, a plant watering system with planned features such as the ability to measure the soil dampness, provide water to the correct amount, and send an sms text message alert.

Other examples included:

- a spiral drawing robot that worked at variable speeds, could be used for road sign writing, and, possibly, played music whilst in operation;
- a robot designed as a personalized message delivery system;
- a smart door with motion sensors and voice recognition;
- a robot to detect and pick-up small items lost on a workshop floor;
- a smart pen with features including an alert system;
- two very different pet exercise robots – one that moved and made a noise so that it would be chased – and one that had remote control operation;
- an automated boat with a whole array of sensors and electronic functionality.

The level of discussion and the complexity of features and design ideas was considered by the research team to be generally very good. It was apparent from the outset that this was something that participants were able to complete within the timeframe and that working as a team (and to some extent competing against the other team) was an engaging and enjoyable experience. There was typically a lot of animated discussion and laughter.

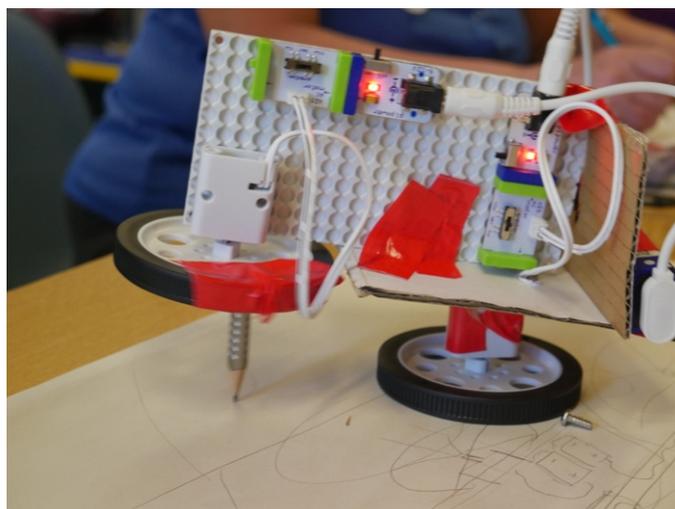


Figure 21 – The 'Rotobot' drawing machine.



8. Results

At the end of each workshop research staff led a discussion, in which participants shared how they felt about the experience of the workshop, and about designing and making with the digital tools available. All participants also completed a brief questionnaire. Points raised in discussion confirmed the results obtained from the questionnaire responses.

The Spark participants were asked to rate their response to a series of questions.

The first question asked: *How familiar were you with digital making technologies, such as 3D printing, before the workshop?* Of the 41 respondents, the average score was 6.2 where 0 meant ‘Not at all familiar’ and 10 meant ‘Very familiar’. About one third of participants rated themselves below 5, in the bottom half of this scale but eight of the 41 participants felt they were very experienced, rating themselves above 8, close to the top of the scale. It was therefore considered, that the workshops had attracted a range of participants, some of whom were very knowledgeable but many of whom were not.

Participants were very clear that they would like digital making facilities in libraries. The average score for the question: *Would you like digital making facilities in your library?* was 9.1 where 0 meant ‘Not really’ and 10 meant ‘Yes, very much’. Indeed, 4 out of 10 participants rated this as highly as they possibly could, marking the end of the scale.

Enthusiasm for starting their own making project was fairly strong. Asked to rate: *Is it likely that you will now start a creative making project yourself, using digital making technologies, in your own time?* The average score was 7.3, where 0 meant ‘Not very likely’ and 10 meant ‘Yes, very likely’.

The question: *Do you feel excited about the potential for creativity and making?* Was rated more highly, with an average score of 8.7, where 0 meant ‘Not much’ and 10 meant ‘A great deal’.

Finally, the workshops themselves were clearly valued. The average score for the Question: *Overall did you enjoy today’s workshop?* was 8.8, where 0 meant ‘Not at all’ and 10 meant ‘Yes, very much’.

The 41 participants were asked to indicate their age range on the questionnaire. Eight were 16 to 18 year olds. Ten were in their 20s and the rest fairly evenly split across the age range (30s, 40s, 50s or 60s) with 4 indicating they were in their 60s. There were 13 women and 28 men.

8.1 Written questionnaire responses

The questionnaire asked participants: *If every local library had a making space, what kinds of things do you think this space could be used for?* An open text box was provided for answers.

The suggestions ranged very widely. Each bullet point below represents a broad area of potential interest and activity, mentioned by participants, and is followed by several questionnaire quotes:

- **Fostering creativity:** “Develop creativity”, “To develop curiosity” “It gives people confidence and encourages creative thinking”
- **As a social space:** “Meet different people” “Share creativity and skills” “Networking” “Making friends”
- **As a community space to tackle community issues:** “Space to get involved with creative technology and share ideas with members of the community” “Communal workshop”, “Projects linked to city future”



- **As an educational facility:** “Educating people about new technologies” “Teaching people how to repair things” “Teaching tech skills and skills related to physical creation (e.g. soldering)”, “Improve my practical skills and carpentry”
- **For entrepreneurship:** “Encouraging and teaching entrepreneurship” “Small business development” “New sorts of innovations”, “New tech, innovation, inventions and practical ideas”

Among the kinds of tasks that participants thought might be undertaken in a library makerspace, the following were mentioned:

- “Making parts to repair domestic equipment”
- “Making parts on larger projects”
- “Trying out new tools”
- “Creating robots”
- “Developing new prototypes”
- “Cutting complex shapes from card”
- “Programming workshops”
- “Test ideas”
- “Coding”
- “App development”
- “Digital training workshops”

The digital fabrication equipment most often mentioned was 3D printing (10 participants) but was closely followed by laser cutting. There was some expectation that facilities within a library would be more able to provide affordable open access, with one participant saying: “Place where people can use 3D printers or laser cutters for cheap prices” and another commenting “Makerspaces are mostly for designers, doing it in the library would mean wider involvement in making, for the wider society”.

In answer to the question: *Would you be interested in making yourself, if so why?* A few of the responses were as follows:

- “I enjoy making things [it gives me] a sense of pride”
- “It’s fun, I enjoy the reward and sense of achievement”
- “As part of artistic practice”
- “To learn more and expand knowledge”
- “To learn and share ideas with people”
- “Yes, it would be good if I could better create things that I need by myself”
- “Yes, several ideas I would love to prototype if I had access to hardware”
- “I am very interested in tinkering with technology”

9. Spark Workshop conclusion

The Spark workshops demonstrated the capacity for engagement and fun with DiDIY technologies and tested the appetite of participants for a design and making challenge.

The overwhelming impression from being present in the workshops was that the participants were fully engaged, enjoyed the experience and delighted in their ability to think up inventions and play with ideas and materials. The enjoyment experienced, with a lot of laughter and spontaneous



applause, especially when prototypes were seen to work is an interesting positive contrast to the difficulty in recruiting participants. Whilst it is difficult to know what barriers there are to people taking the first steps toward creative engagement, it does appear that people would enjoy and find valuable this type of experience, as an introduction to DiDIY, if persuaded to engage.

This research has indicated that there are many potential benefits from engaging with DiDIY and making for individuals, communities and society. The Spark workshops confirm the findings of the Makerlab workshops and D5.2 Social Impact of DiDIY, in that participants saw very similar areas of potential opportunity in library makerspaces; such as opportunities for creativity, sharing, community engagement, education and entrepreneurship.

This research has shown that taking an active and positive approach to creative problem solving is a foundation stone of maker's creative practice and process. Creative problem solving is also a key skill required to meet changing employment needs (Wagner, 2012; Robinson & Aronica, 2015). However, without the willingness of more members of the general public to engage and explore creativity and making, DiDIY will remain an activity among limited communities, online and offline, and have limited social impact. Further research would be required to establish whether taking part in a one-off workshop leads to further creative engagement and how opportunities for DiDIY creativity can best be located, organized, funded and presented in ways that do most to overcome barriers to engagement, and appeal to as wide a range of participants as possible.



Overall conclusion

This phase of the DiDIY research began by asking the question: What is the social impact of making from the makers' perspective? It aimed to explore what making means to makers, what difference digital affordances make to practice, and to identify areas of personal and social impact resulting from DiDIY activities. In addition, we considered the potential for sparking creative engagement through making in public libraries.

A wide range of participants (in terms of age, gender representation, prior knowledge and skill level, creative practice, and location) – and relatively large number of them (136) – took part in workshops. Participants included hobby enthusiasts, dedicated crafts people, amateur and professional makers of all types, including some small business entrepreneurs. They had a wide range of digital expertise and skills, and worked in a very wide range of media and materials.

The research team made use of two novel and engaging research workshop formats, inviting makers to use simple craft materials and LEGO to explore and describe their creative practice through metaphors, and using DiDIY technologies for a team design challenge.

We found that makers agree that new opportunities have been opened up on a personal and collective level by digital capabilities. These were described in detail and included gaining inspiration online, digital content sharing, learning from online sources, forming collaborations, selling and business opportunities, enabling innovation, undertaking joint projects, and finding new ways to interact with the world and each other. There was a general recognition that digital technologies helped to extend practice, but also some concern and disquiet about the overarching nature of digital connectivity.

We found commonality among makers and, despite the wide range of creative practices, very similar benefits were identified. On a personal level these included the enjoyment of creativity, a sense of improved creative confidence, developing an attitude and approach of creative problem solving, and an enhanced sense of well-being. On a societal level potential benefits were identified such as improved social connectedness, community cohesion and the ability to solve local and environmental problems. A desire to see public libraries as a site for making activities was strong among our library workshop participants.

One key theme from both sets of workshops was the role that DiDIY can play in exploring and forging positive outcomes between digital connectivity (and its vast opportunities) and the physicality of making and face-to-face community connectedness (and its potential for well-being and social impact). In this way DiDIY provides an integration between the digital and the physical, a connectedness that people saw as enjoyable and valuable. As one of the library participants indicated in a comment on her workshop experience: “People used to discuss more, and this is a bit like that”.



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