

OPEN DATASET OF UK MAKERSPACES

A USER'S GUIDE

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Infographics by Lulu Pinney

INTRODUCTION

The UK has witnessed an explosion of makerspaces, fablabs, hackerspaces and community workshops, growing from a handful to nearly 100 in the last decade. Recognised as sites of civic and social innovation,¹ creativity and learning, makerspaces are increasingly held up as potential game changers for design, entrepreneurship, fabrication, manufacturing, and technological innovation. Pundits ask whether they can lead the transition to more sustainable forms of production and consumption, or provide solutions for economic recovery.²

With such promise, it's no surprise that others are looking to get in on the action. Northern Ireland's Department for Culture, Arts and Leisure invested £350,000 into existing makerspaces in 2014,³ while the Department of Business, Innovation and Skills recently announced plans to create a makerspace in disused military workshops.⁴ Higher education institutions like Cardiff Metropolitan University, Falmouth University, the University of Strathclyde, the University of Kent, and University College London are now hosting on-campus makerspaces. Even historical landmarks and cultural institutions are finding ways to work with makerspaces and their surrounding communities – as seen through Makerversity at Somerset House,⁵ the RSA's partnership with Fab Lab London,⁶ and the British Council's Maker Library Network.⁷

Amidst this rising interest in makerspaces, it can be difficult to understand the many different forms they take; to get a sense of the scale at which they are operating and the size of the movement in general. Research into makerspaces and maker communities has been undertaken by academic centres⁸ and there are a number of lists and maps of UK makerspaces.⁹ However, there is a clear opportunity to map makerspaces across the UK in more detail; gaining a deeper understanding of what's happening across the country.

In response to this opportunity, Nesta has taken the initial step of creating an open dataset of UK makerspaces. The following paper highlights the key finding and trends from within this dataset. It also sets out other opportunities to make use of the dataset, and proposes a set of categories and comparative features for making sense of the variety of makerspaces in the UK.

This work has been motivated by a long-standing interest in makerspaces. Over the years, we have supported several makerspaces through practical programmes – including the UK's first FabLab in Manchester, as well as Fab Lab Devon, Makerversity and Black Country Atelier through our Digital Makers fund. Makerspaces have also featured across our research on the collaborative economy, digital social innovation, digital education and smart cities.

How we created the dataset

This open dataset of UK makerspaces is based on desk research and a survey of UK makerspaces carried out from November 2014 to January 2015. In keeping with the open dataset, we also tried to incorporate a spirit of openness and transparency throughout the research process.¹⁰

From the first stages of research, we consulted makerspaces, researchers and other stakeholders on questions to ask and which spaces to approach. We then reached out through our networks, and used existing resources to compile our initial list of candidate makerspaces. These makerspaces were asked to supply as much data as they could through our survey. An alpha version of the dataset was published so makerspaces had the opportunity to review, comment and amend any information. We then filled in the gaps, through a combination of web research and follow-up interviews.

The dataset is now available and licensed under a **Creative Commons Attribution-ShareAlike licence**.¹¹ This means that anyone can use the data, as long as they credit Nesta and share their work under the same terms.

How to use the dataset

At the simplest level, this dataset gives a snapshot in UK makerspaces in 2014-15. It can be used by anyone for a variety of purposes. The dataset can be interrogated on its own or in conjunction with other research to shed more light on UK makerspaces. It can also be used as a baseline for future research. Equally, the data could be adapted to help inform and build other resources and services – such as maps, lists, or interactive platforms.

Makerspaces – a pragmatic definition

Makerspace, fab lab, hackerspace... no single term perfectly captures all spaces. Some spaces, like MAKLab in Glasgow, provide an extensive selection of manufacturing and digital prototyping tools to large and varied user base. Others, like the Waiting Room's makerspace in Colchester, are within a wider collection of community spaces - including a kitchen and darkrooms. A few, like Eagle House Pop-up Furniture Factory in Knowle West, are even temporary - opening briefly to offer training for local residents or capitalise on an unused space.

Recognising the challenge of finding an accurate yet inclusive definition, we have selected to use the term makerspace to broadly apply to an open workshop with different tools and equipment, where people can go independently to make something. Within the scope of this project we have defined a makerspace as an open access space (free or paid), with facilities for different practices, where anyone can come and make something. With this in mind, we also distinguish makerspaces from private or single-practice workshops and studios - despite their many similarities.¹² As makerspaces continue to emerge and develop, we expect definitions to continue changing.

While useful, this dataset also has limitations. Although nearly 100 makerspaces are included in the dataset, not everyone had the same information available. Response rates are much lower for some parts of the dataset (such as anonymised financial data). Most of the data is self-reported, so we cannot guarantee the accuracy of every piece of information. As with any field undergoing rapid growth, this data will become out of date rapidly and its value will shift to providing a historical record, rather than a current picture of makerspaces.

SECTION ONE

KEY FINDINGS FROM THE DATASET

Anyone can interrogate the dataset. However, not everyone has the time, appetite, or capacity to do so.

So we are also sharing a selection of the most interesting trends we found. This is not intended to be a full report of every finding but rather, some top-level findings – and inspiration for you to use this data to build tools or services or research further.

Geographic spread

Makerspaces can be found in every region of the UK, with most of the UK's cities having at least one makerspace. However, the density and number of makerspaces differs by region. London, the North West, the South East and Scotland each have more than ten makerspaces. Meanwhile, the East Midlands, Northern Ireland and the North East are respectively home to less than five. London, Scotland and Wales have the most makerspaces per capita, while North East, East of England, and East and West Midlands have the fewest.

While most makerspaces are in long-term or permanent locations, nearly a quarter are temporary or mobile makerspaces, or in the midst of transitioning to another location. Unsurprisingly, non-permanent makerspaces tended to be smaller.

UK makerspaces also come in a variety of shapes and sizes. Nationally, the average makerspace is 209m², but makerspaces range from 12 to 1,022m². London has both the smallest and largest reported makerspaces: the Goodlife Centre in Southwark and Building BloQs in Enfield, respectively. Where there is a lower number of makerspaces (such as the East Midlands or North East), the region tends to have a larger proportion of smaller makerspaces with one or two large makerspaces dominating the area.

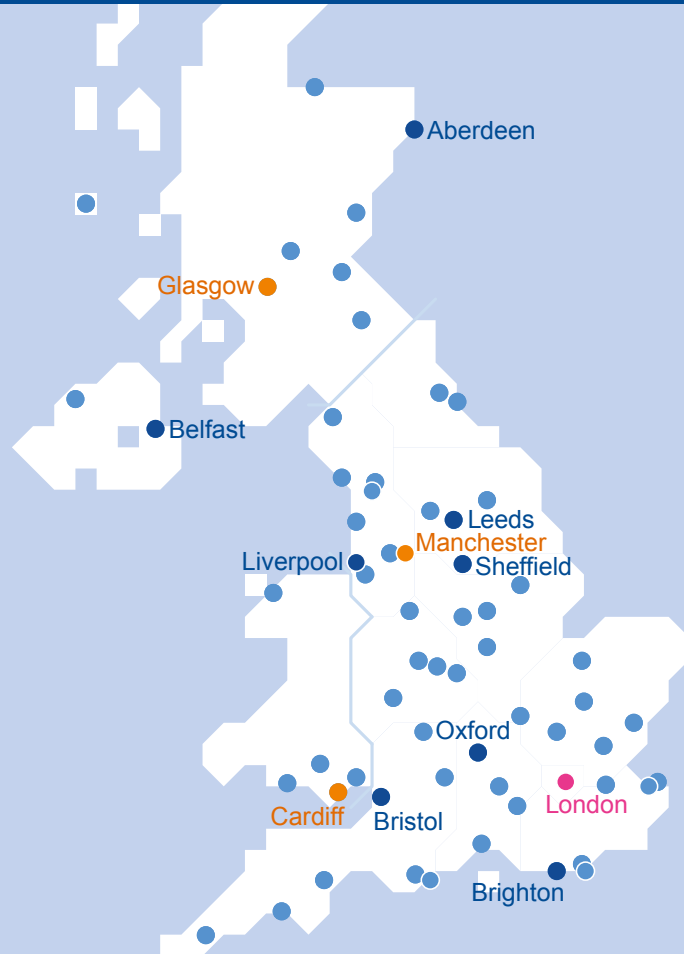
UK MAKERSPACES | The Spaces

97

makerspaces
were found
across the UK

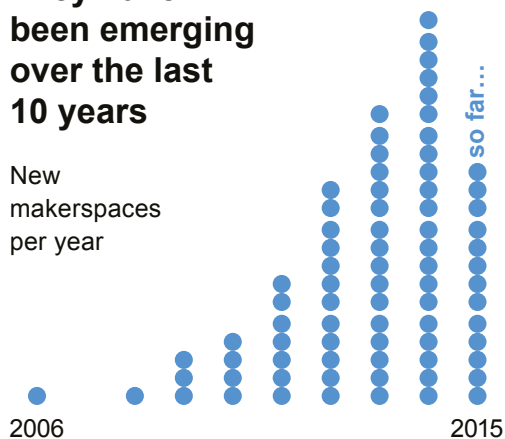
Number of
makerspaces
per town or city

- 1
- 2
- 3
- 20



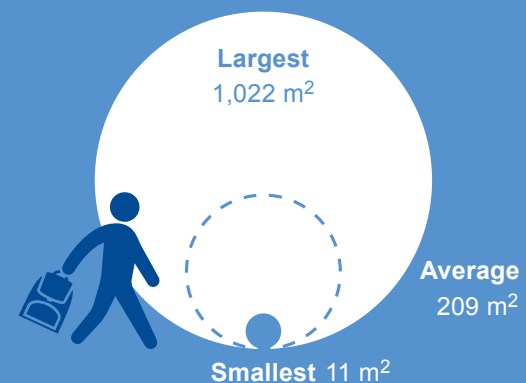
They have
been emerging
over the last
10 years

New
makerspaces
per year



Makerspaces come in all sizes

Sample: 52



But nothing's set in stone: nearly a quarter of these spaces
are temporary, mobile or in transition

Sample size: 92

Tools, equipment and materials

The range of tools on offer in makerspaces differs considerably. Nearly two-thirds of spaces offer more than five different types of tools.

Digital and manual tools are both found in the majority of spaces. Digital fabrication tools are the most commonly reported (73 per cent), followed by general hand tools (60 per cent), electronics (60 per cent), and woodwork (52 per cent). Half of spaces also have computing tools. Equally, a considerable minority of makerspaces have tools for specific activities, including printmaking and photography, ceramics and sculpture, as well as science, synthetic biology and chemistry tools. For instance, MadLab in Manchester has a full bio lab, while the London Sculpture Workshop is the city's first open access sculpture workshop. As you'd expect, the materials used in makerspaces correlate to a large extent with the types of tools available.

Services, amenities and accessibility

Tools and equipment aren't the only things that define a makerspace. Most makerspaces offer additional services and amenities. Over half of makerspaces provide shared kitchens and space for socialising. More than ten spaces also have galleries, cafes and libraries on site. Interestingly, makerspaces are more likely to have wifi (89 per cent) than toilets (86 per cent). Sixteen spaces also offered commercial services for their members.

The vast majority of makerspaces also provide support and educational opportunities. Over half of makerspaces provide tool inductions, formal courses, and informal help, while only 9 per cent offered no form of training. For instance, Reading Hackspace and Arloesi Pontio Innovation in Wales both reported offering a combination of technical support, informal help, classes, tool inductions, and advanced tool training. A smaller number of spaces also reported offering additional educational opportunities like school programmes (24 makerspaces), affiliated programmes (ten makerspaces), and qualification opportunities (six makerspaces).

Many makerspaces also endeavour to be accessible, although certain groups are more likely to be accommodated than others. Over 80 per cent of makerspaces are wheelchair accessible compared to approximately half which allow guide dogs. They are also family friendly, with nearly three-quarters of makerspaces welcoming children into the workspace (61 per cent) or into the makerspace, but not the workspace (13 per cent). Over one-quarter of makerspaces even allow dogs.

UK MAKERSPACES | Activity

Top three reasons people use makerspaces

November 2014
Sample: 51



% of makerspaces where half or more users are...

SOCIALISING 41%
LEARNING 35%
MAKING 33%

Socialising

% of makerspaces that have...



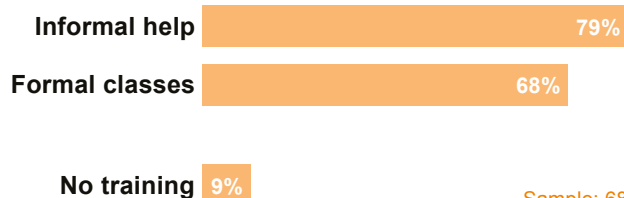
Wheelchair access	82%	Wifi	89%
Children allowed in workspace <i>with and/or without supervision</i>	61%	Toilets	86%
Children welcome but not in workspace	13%	Kitchen shared	61%
Guide dogs welcome	48%	Social area	58%
All dogs welcome	28%	Storage long-term	45%
		Library	29%

Sample: 67

Sample: 76

Learning

% of makerspaces offering...



Sample: 68



Other services offered by makerspaces include school programmes 63%, commercial consultancy 42%, affiliated programmes 26% and qualification opportunities 16%

Sample: 38

Making

Top ten types of tools found in makerspaces

% of makerspaces with these types of tools

Digital fabrication



General hand tools



Electronics



Woodwork



Computing



Fabrics



Display



Bench mounted/freestanding tools



Metalwork



Plastics



Sample: 87

Members, visits and staff

Most UK makerspaces have small member communities, with 60 per cent having 50 members or less. Five per cent have over 1,000 members, indicating a handful of larger spaces across the country: Manchester Fab Lab reported the largest membership rates, followed by MadLab (Manchester), and London Hackspace. Men tend to dominate membership: membership is predominantly male in 80 per cent of makerspaces, compared to 18 per cent of spaces which have 50 per cent or more female members.

Membership rates can give a sense of who's visiting a makerspace, but it doesn't necessarily represent the total user base. One-quarter of makerspaces are not member organisations. Equally, over half of makerspaces are open to public in set hours. Unique visits help to account for people who visit makerspaces which don't have membership schemes or drop in during public hours. Three-quarters of makerspaces received up to 250 unique visits in November 2014. Approximately 5 per cent reported over 5,000 visits during this month. Visitors' reasons for accessing the makerspace were predominantly social – 'making' was the third most common reason people visited makerspaces, after 'socialising' and 'learning'. This is particularly interesting as it challenges assumptions about makerspaces being solely spaces for making things – although that is undoubtedly a fundamental feature. Makerspaces also cultivate relationships and networks, and provide a setting where people can learn, experiment and explore.

Makerspaces rely on a combination of informal and paid roles to operate. Voluntary staff and informal user support are important features of many makerspaces. However, over 40 per cent also employ technicians on a full or part-time basis. Beyond technical staff, a minority of makerspaces also employ office staff (11 per cent).

External connections

Many makerspaces are active within wider maker communities. Approximately two-thirds regularly collaborate with other makerspaces or take part in online makerspace forums, mailing lists or communities, while 46 per cent contribute to open hardware or open source projects. Along with individual connections, established networks like Fab Lab UK, and the Open Workshops London are important settings for meeting and collaborating with other makerspaces.

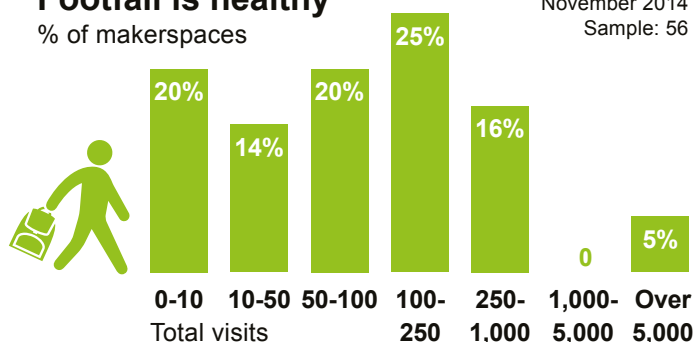
A considerable minority are also well connected to their local communities: over 40 per cent have relationships with their local council while 65 per cent know their neighbours. Over 80 per cent also host or have a presence at off-site events. Maker Faires and festivals – whether the annual UK Maker Faire in Newcastle, local Mini Maker Faires, or unbranded maker festivals – were by far the most popular type of event attended by makerspaces.

UK MAKERSPACES | Community

Footfall is healthy

% of makerspaces

November 2014
Sample: 56



% of makerspaces staffed by...

Volunteers	42%
Technicians <i>Full time or part time</i>	42%
Office staff	11%

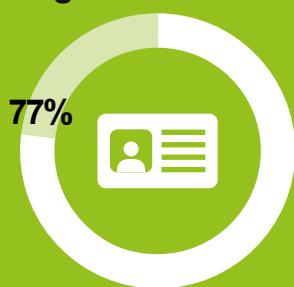


And offering...

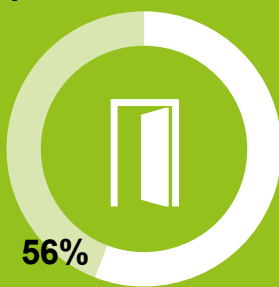
Informal user support	35%
Business support	11%

Sample: 72

Most makerspaces are member organisations



As well as being open to the public in set hours



Sample: 81

At the moment more men than women are using makerspaces

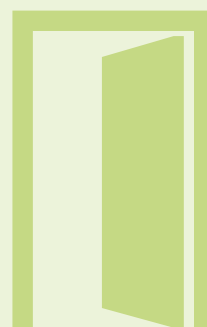
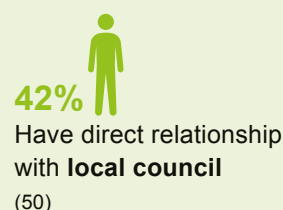
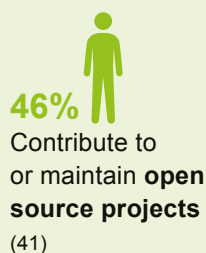
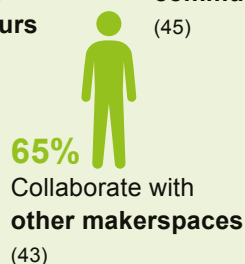
% of makerspaces where half or more users are...

MEN 80%
WOMEN 18%

Sample: 60

Makerspaces are good at engaging locally as well as with the makerspace community

(Sample size given in brackets)



Sustainability and membership

To understand how makerspaces sustain themselves, our survey included several questions on income and expenditure. While the individual responses provide a useful illustration, low response rates to these optional questions make generalisations difficult. Within this group, turnover ranges considerably – from £0 to £350,000.

Membership models also vary: 55 per cent of makerspaces reported having flat monthly or annual payment models compared to 21 per cent who have varied fee models – where prices differ according to the frequency someone uses the space and the services they access.

These modes also appear to have different membership rates.

Makerspaces with varied payment models have 83 members on average, while makerspaces charging flat fees have 108 members on average. Conversely, 24 per cent of makerspaces have no membership fees, and an average of 81 members.

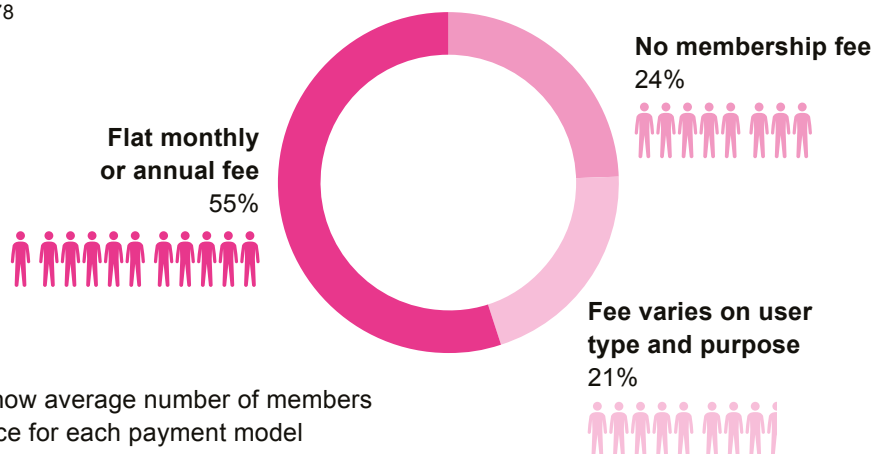
Looking at legal structure and founders, makerspaces are primarily split between informal collaborations and business initiatives. Nearly half of makerspaces were founded by informal groups, while approximately one-third emerged from existing companies or organisations. Founders with backgrounds in design, digital and technology/IT, or engineering are particularly common.

Legal structures are also split, but more often formalised. One-fifth of makerspaces operate as either informal collaborations or unincorporated organisations, compared to 55 per cent which have registered as some form of company. Public sector involvement in makerspaces is low – less than 5 per cent of makerspaces were founded or operated by government or public institutions. For instance, Devon County Council was the only council to have founded a makerspace (Fab Lab Devon), while Blackhorse Workshop received initial support from the Borough of Waltham Forest and the Greater London Authority. It is worth noting, however, that a number of spaces are hosted by higher education institutions.


UK MAKERSPACES | Business

The most common payment model is a regular membership fee

Sample: 78



Icons show average number of members per space for each payment model

Each  = 10 people

Annual turnovers* vary hugely

Sample: 21

Smallest

Largest

£0

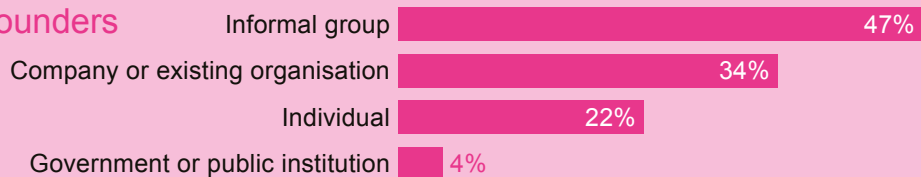
£350,000

* Income sources include corporate income, membership, training and courses, space or desk hire, shops, cafes, grants, public funds, donations, and sponsorship. Costs include premises and utilities, insurance, staff, equipment, marketing, events, and business rates.

How makerspaces are structured

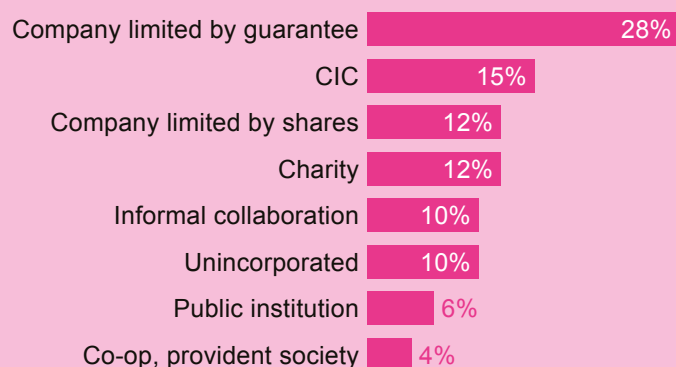
By their founders

Sample: 68



Legally

Sample: 67



Aspirations

As well as asking makerspaces to report numbers, we also asked them some qualitative questions. While we should be careful about generalising from their responses, some notable commonalities emerged:

Makerspaces are united by a shared belief in the importance of working with your hands, or of engaging actively with technology, and often by a desire to foster this in others.

Many aim to incubate businesses, help makers earn a living, and give people career pathways in making. They cite spin-off businesses or professional makers using the space as points of pride:

“30+ individuals/households are substantially or wholly supported by their breadwinner working at Building BloQs.”

“A number of projects have used Hackspace facilities to prototype designs that have gone on to become successful on a wider scale...”

Development is a primary ambition for most makerspaces. Along with finding ways to ensure their own sustainability, makerspaces often try to support members in completing challenging projects or developing their own businesses.

“Many people have completely changed the direction of their lives due to the hackspace, starting businesses and doing things they never thought possible.”

“To help create livelihoods and business opportunities for people who might not otherwise be able to turn their hobby into an enterprise, or make their micro-business sustainable.”

For founders and managers, the makerspace is a project in itself. This brings challenges and rewards:

“Running a makerspace is for many an end in itself (though the day-to-day may be a pain) to do something enterprising, with friends, to start something and build a community.”

Many makerspaces look out to their local community, or aim to tackle specific local issues, such as developing a rural economy, addressing unemployment, or providing an alternative to school-based education:

“To tackle endemic local unemployment, challenge poverty of opportunity, aid in regeneration, maintain the skills base. To be part of our community and help make it stronger, better and more fun.”

“With our mobile schools programme we will give children and young people practical experience of digital manufacturing, enhancing their awareness of the possible careers of the future at a young age (Primary), and teaching them transferable skills for employment (Secondary).”

Challenges

UK makerspaces aren't without challenges. Makerspaces need an immense amount of effort to keep running. Founders can struggle to maintain their energy over time, particularly if members show limited interest in contributing to the running of the space. Spaces operating on a co-operative model, or governing through consensus can find decision-making and change difficult to manage.

“ *Consensus-based decision-making is great for helping people feel included, but rubbish for getting to any decision or for providing quick answers or physical deliverables when there are deadlines. ... Endless discussion will also burn people out and cause them to quit.* ”

“ *I had hoped it would run itself a lot more than it has.* ”

“ *A tendency for the members to look to the founders to organise everything for them, and little in the way of community self-support.* ”

Money is frequently an issue. Income from membership and other services isn't always guaranteed to cover costs. As such, many makerspaces are often reliant on external support, such as grant funding or university subsidies. External funding can allow makerspaces to hire technicians, invest in expensive equipment, experiment with commercial or community services, or play with new materials. However, varying legal structures and goals can make makerspaces ambiguous targets for funders and investors. Equally, funding and partnerships introduce conditions which may constrain the makerspace's activities.

“ *Falling through the cracks for funding - a limited company with completely social aims but didn't want to be seen as a project so registered limited.* ”

“ *Under capitalisation which has impacted on costs of delay. Being an innovative and disruptive model the money men don't know where to pigeonhole us.* ”

“ *Working in partnership with large institutions has often slowed down what would otherwise be a very fast moving project.* ”

SECTION TWO

TWO WAYS OF UNDERSTANDING UK MAKERSPACES

While we should be careful to note this is a subjective interpretation, in the course of collecting and reviewing this data, we did note some patterns emerging, specifically common types of makerspaces currently in existence and key features for comparing makerspaces more generally.

Common types of makerspaces

Previous research has highlighted distinct types of makerspaces – fab labs, hackerspaces, techshops and community workshops.¹³ Within this dataset we have seen an increasing trend towards ‘hybrid’ spaces that identify as two or more of these types. There are some common business model attributes found across each type of space, and the ‘hybrid’ spaces appear to select and combine some of the more successful attributes.

Using the dataset we identified several types of makerspace with distinct approaches, membership structures and business models. These types reflect how the makerspace self-identifies in their name and publicity, as well as their operating model, as evidenced in the dataset.

The **Hackerspace Clubhouse** has a consistent and inflexible monthly fee and a small user base, primarily enabling making, hacking and socialising for a group of like-minded individuals. The clubhouse hackerspaces have low overheads and tend to be unincorporated. They have a core group of active members, with a low proportion of non-core paying members.

The **Grassroots Hackerspace** has a tendency towards ‘pay what you can, but pay monthly’ membership fee, or none at all. It relies on goodwill, sponsorship and income generated through hosting events and training. This type of makerspace reflects the largest user base of the makerspace types and is used by 18 makerspaces representing a combined membership of 6,726 in the dataset. These are active within their local community and run membership drives to attract and diversify their membership. They maintain both open source projects and a regular programme of events.

Fab labs are the most consistent of the makerspace types. Founded by MIT’s Centre for Bits and Atoms, fab labs are part of a standardised and franchised global network. To be recognised as a fab lab, these types

of makerspaces adhere to the Fab Charter,¹⁴ and commit to providing a common set of industrial-grade fabrication and electronics tools, processes, and open source software and programs. Education and outreach are also common priorities for these types of makerspaces. Compared to other types of makerspaces, UK fab labs collectively have the second highest number of members within our dataset.

Within the dataset, we can see variations in the approach and membership structure between **standalone fab labs** and **embedded fab labs** in institutions such as universities or non-profits. While both types include a standard set of equipment, the approach to community and commercial use can vary with embedded fab labs including additional limitations such as pay-per-hour machine use for individuals and businesses. Unsurprisingly, fab labs embedded in educational institutions (such as universities) tended to have a student-heavy membership demographic.

Makespace - An increasing number of makerspace identify solely as a makespace or makerspace – yes, the same term we’re using to reference all these spaces. Makespaces are similar to the grassroot

hackerspaces, but are not affiliated with the wider hackerspace community. They also don't share hackerspaces' emphasis on open source software. Available tools, equipment and services vary considerably, although makerspaces are all well-equipped. They also appear to place considerable emphasis on providing opportunities for a community of makers. These spaces tend to operate using 'Pay Monthly' structures and are often incorporated as a company limited by shares or guarantee. Some operate a for profit model.

Machine shops – although the UK is yet to have a TechShop,¹⁵ there is a recent cohort of makerspaces that are staffed, offer pay-as-you-go machine use, and focus on prototyping and small scale production. These tend to have a low user base in comparison to hackerspaces. Several makerspaces in our dataset exemplified this type, with a collective membership base of 620 makers. Some of these spaces also offer non-maker-facing fabrication services.

Civic workspaces – Some of the makerspaces reflected in the dataset have been grant or publically funded with a remit to engage with a particular community or social issue – acting as a tool for regeneration and often working alongside housing developments or public services, such as libraries. These types of spaces don't tend to charge membership fees to people who fit their target audience and charitable intent.

Cluster model – This type of makerspace combines the resources of a fab lab or machine shop with desk space or co-working. The combination of services gives maker or design startups easy and lower cost access to the range of facilities they need to operate – from business services to technical equipment. This type of makerspace tends to have founders who are maker or designer startups themselves. They also generate income through consultancy or design services and event hosting, appeared to have the highest financial turnovers.

Features for comparison

Along with prevailing types of UK makerspaces, we found several features which are helpful for comparing makerspaces more generally. These features could be used as individual measures for comparison, or taken together to give a more rounded of view.

Inward <-> outward facing

Some spaces offer workshop space for full-time professional makers or have a tight-knit community of members, while others are trying to address social needs in the local community, or focusing on education.

Relevant data: marketing, community events, ambition, source of funding.

Prototyping <-> tinkering

Some have a commercial focus, incubating startups or craftspeople, while others are a place for play and freetime activities outside of work.

Relevant data: membership types, facilities, access to tools, types of tools, income sources.

Rooted <-> ephemeral

Some makerspaces are here to stay, and heavily invested in property, community, or funding relationships. Others are little more than an informal meetup in a pub or co-working space. Spaces often move along this path, becoming more rooted over time.

Relevant data: temporary/permanent space, how long open for, reason for move from previous space.

Digital <-> material

Spaces coming from a craft tradition may have tools that allow engagement with more varied materials. Other makerspaces focus on digital tools such as CNC mills, laser cutters and 3D printers, where materials are less the focus.

Relevant data: tool types, material types.

Independent <-> co-dependent

While originally a grassroots movement, makerspaces have also become integrated into other institutions, particularly universities. Many makerspaces, even those not located on a campus, or in a business

park, are tightly aligned in goals and/or funding with a host or partner organisation.

Relevant data: programmes, founders, relationship with council, who owns the space, income.

A final word...

We want you to use this dataset. Either to inform yourself, your project or your organisation, or to build new products, or as a constituent of another data set. It's licensed under a **Creative Commons Attribution-ShareAlike licence**.¹⁶ You don't need to ask our permission to use it (though we'd love to hear about any use you put it to). And you can republish it or integrate it into other data sets or products, even commercial ones, as long as you credit Nesta and share the work under the same terms.

Endnotes

1. <http://www.nesta.org.uk/publications/growing-digital-social-innovation-ecosystem-europe>
2. www.theguardian.com/commentisfree/2015/jan/06/britain-economic-recovery-local-enterprises-building-bloqs
3. <http://www.fablabni.com/news/major-coup-fablab-derry-dcal-commits-additional-funding-fabricating-future-conference>
4. <https://www.gov.uk/government/news/making-space-for-ex-military-personnel>
5. <http://makerversity.org/about/>
6. <http://fablablondon.org/>
7. <http://makerlibrarynetwork.org/>
8. For example: <http://www.rca.ac.uk/news-and-events/news/design-products-research-grassroots-makerspaces/>, <http://grassrootsinnovations.org/>, <http://www.ifm.eng.cam.ac.uk/research/teg/digital-fabrication/>
9. Including: <http://openworkshopnetwork.com/>, <http://makeworks.co.uk/>, http://www.hackspace.org.uk/view/Main_Page, <http://makerspace.com/>, <https://www.fablabs.io/>, <http://www.fabfoundation.org/fab-labs/>
10. <http://www.nesta.org.uk/blog/mapping-uk-makerspaces-building-useful-data-set>
11. <http://creativecommons.org/licenses/by-sa/4.0/>
12. <http://www.nesta.org.uk/blog/mapping-uk-makerspaces-building-useful-data-set#sthash.XT7gic85.dpuf>
13. <http://opendesignnow.org/index.php/article/libraries-of-the-peer-production-era-peter-troxler/>, <http://makezine.com/2013/05/22/the-difference-between-hackerspaces-makerspaces-techshops-and-fablabs/>, http://p2pfoundation.net/Business_Models_for_Fab_Labs
14. <http://fab.cba.mit.edu/about/charter/>
15. <http://www.innovationbham.com/2014/07/31/techshops-not-so-secret-ingredient/>
16. <http://creativecommons.org/licenses/by-sa/4.0/>

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