MEDCITY

COMMUNITY & CLUSTER DYNAMICS

How life science clusters can enrich local communities

2022

CONTENTS

FOREWORD

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MedCity's work in cluster development is to facilitate the development of the right spaces to promote the growth of a cohesive multi-sector life science community, ultimately growing our economy and improving health outcomes.

London, although one city, has multiple regions with their own scientific and research areas of strength, healthcare needs, and socio-economic profiles. In our work advising local authorities and planners on life sciences, and on supporting inward investors and developers, we found that that there was an information asymmetry between these various organisations on the criteria important for life science development at local community level.

This report and framework developed in partnership with UCL and supported by local authorities in the LIFT programme is designed to be a resource to aid the development of life science space that benefits all stakeholders and, most of all, the communities that we serve.

INTRODUCTION

This report builds on MedCity's London Life Sciences Real Estate Demand Report, which identified a chronic lack of space for life sciences companies to grow in London, in order to investigate the relationship between life sciences clusters and the wider, co-located community. Specifically it investigates how local communities can benefit from the presence of life sciences clusters.

By exploring the dimensions of placemaking, job creation, education and talent development, and inclusivity within local health systems, the report seeks to outline key considerations for local authorities in making planning decisions, tendering for projects, engaging with local communities, and considering the implications for policy implementation. The parameters covered here are interdependent, though for ease of analysis each is treated distinctly.

We assessed and validated the significance of these parameters through desk-based research. The approach was to conduct a review of existing literature on the parameters, coupled with interviews with stakeholders at local authorities to produce a synthesis of the main findings highlighting the spillover effects of clusters on local communities. Local authorities with life sciences activity in their patch, and with whom MedCity has existing relationships, were engaged in these interviews.

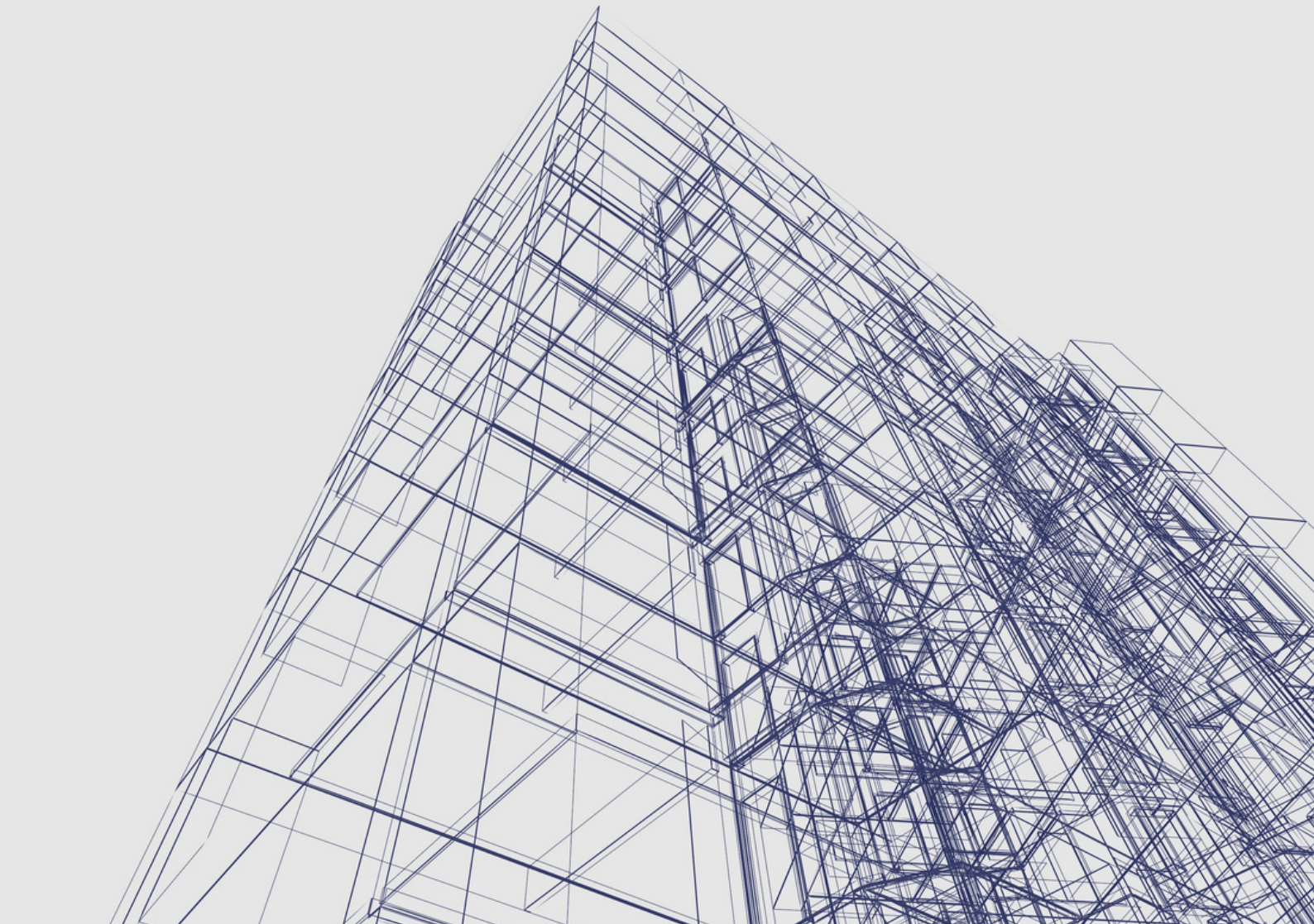
The document is intended as a starting point for discussion on the potential of fostering life-sciences communities to stimulate wider community prosperity and well being, local economic growth, and urban regeneration and sustainability.

SUMMARY OF KEY FINDINGS

BACKGROUND

Evidence internationally points to life sciences activity increasingly clustering in urban areas, as distinct from regional science parks. Motivators include co-location with innovators, researchers and investors, talent sources; access to global and national transport links; and amenity for employees in order to attract and retain talent.

The aglommeration benefits of clustering, combined with the high GVA generated by life science jobs, provide an opportunity for local government to capitalise on life science clusters for the benefit of the wider community.



PLACEMAKING

I. Leveraging opportunities presented by life sciences clustering can be activated through effective placemaking strategies. Placemaking dimensions include:

- Building design: for flexibility of use and public access, providing interfaces for community engagement
- Allocation of space to create dynamic interactions: with community input and understanding of the value of infrastructure developments an imperative
- Sustainability & Net Zero: encompassing green architecture and engineering; decarbonising by design; spatial planning for sustainable urban mobility

II. Decision-makers at local planning level can benefit from support to assess what a "good" life science building looks like, including guidance on:

- Energy needs, usage and sustainability best practice for LS architecture
- Understanding differing technical requirements for space among life science sub-sectors. E.g. cell & gene manufacturing, gene sequencing
- Which sub-sectors have high demand for space, both those companies within a borough, and those beyond that may be attracted in by provision of appropriate space
- Models for delivery of affordable space

GVA & JOB CREATION

III. Life science clusters stimulate GVA growth and job creation

- Booming sector with record investment into London Life Sciences, leading to creation of direct and indirect high-quality jobs
- Life Sciences is a major contributor to employment, taxes and GDP – providing skilled and highly productive jobs
- Each UK life sciences job generates GVA of £104,000 – twice the UK average of £49,000 (Sources: PwC analysis, Office for National Statistics, Eurostat)
- Indirect jobs are created along the supply chain, and induced jobs are a further benefit of life science employees' daily activities
- In a 2015 study, PwC identified that 146,000 direct life science jobs supported 196,000 indirect jobs in the UK, via the sector's supply chain

IV. Skills diversification

- Mapping of job creation pathways is important to understand how movement from entry level to senior positions can be facilitated, and how training, work placement programmes and educational provision can best support this

EDUCATION & TRAINING

V. Life science clusters strengthen their local communities through the opportunities for education, training, and up-skilling:

- Local life science communities can play a crucial role in bridging the gap between formal education and real-world skills, through mentoring, training, and internship schemes
- Apprenticeships: the number of science-related apprenticeships offered has increased, providing valuable work experience for students. This is supported in the UK by the Apprenticeship Levy
- Mentoring programmes and schools engagement through life sciences companies and institutions are an effective way to upskill local members of the community and increase permeability between centres of knowledge and expertise

LOCAL HEALTH

VI. Small-scale interventions to involve the community in the process of their health are becoming more relevant, rather than trying to involve them through broad national policies. Some examples include:

- Inviting local public participation in clinical research
- Attracting decentralised clinical trials and telehealth trials to a borough offers opportunity for local involvement in the development of healthcare technology with potential to impact local patient populations
- Community participation in local biobanks reinforces a sense of contribution by the scientific industry to the local community, while addressing diversity imbalances in sample and data collections used to develop healthcare therapies

DEFINITIONS

Community

In many ways, the Covid-19 pandemic has highlighted the **importance of community** to our overall wellbeing. However, understandings of the term community and who is included in it vary.

The **Centre for Social Justice** (CSJ) recently carried out qualitative research to find out what community means to people in the UK. They were able to draw a distinction between '**local community**' and **'community of interest**' [1]. According to this distinction, the **'life science community**' is a community of interest. Though those working in the life sciences may come from different cultural and disciplinary backgrounds, they have a common interest in research, advancement, and innovation in the life sciences [2]. The collaboration fostered in this network of individuals and institutions is largely dependent on this common interest.

A **'local community',** on the other hand, consists of the residents, organisations, resources, built environment, etc. within a local area. Local authorities seeking to strengthen community engagement or cohesion are **targeting local communities** rather than communities of interest [3].

The CSJ determines three key aspects or 'pillars' of a thriving local community: **Security, Connection** and **Belonging** [4]. These factors can be actively strengthened, for instance by improving residents' sense of stability and agency. At many points, however, the two forms of community **intersect.** The intersection explored in this report is how a life sciences cluster, as a '**community of interest',** can benefit and strengthen its **'local community'.**

Clusters

Industrial clusters are groups of firms and institutions of a specific field within a particular geographic area. Other stakeholders can include universities, governmental institutions, suppliers of specific goods/services, or consumers. Clusters can be spread across geographical boundaries; they are bound by the scope of their links and connections. Often clusters are characterised by their competitive advantage, as the improved access to information, employees, suppliers, goods, etc. allows for companies to be more productive, innovative, and entrepreneurial [5].

Life science clusters are often formed along a "quintuple helix" consisting of universities, hospitals, life science industries and, most recently, the "societal and environmental benefits" of the cluster [6]. The characteristic interconnectedness and collaboration of clusters benefits all the stakeholders involved, as well as overall advancement in the field. The leading life sciences cluster in Europe is the "Golden Triangle" of London, Cambridge, and Oxford, known for excellence across higher education, R&D, entrepreneurship, and access to funding [7].

Life Sciences

The life sciences include many scientific disciplines concerned with human life and health, such as biomedical science, clinical biochemistry, virology. The life science industry can be broadly divided into biopharmaceuticals and medical technology. These sub-sectors develop, produce and sell therapeutic products and medical devices respectively. The supply chain and specialist services of the two sectors also form part of the industry [8].

The turnover of the life science industry in the UK in 2020 was £88.9 billion [9]. 44% of this turnover is generated by the top three segments of the industry: Small Molecules, Single Use Technology, and Therapeutic Proteins [10]. 268,000 people were employed in the life sciences industry in 2020 [11]. Along with responding to the COVID-19 pandemic, current priorities of the industry are finding cures and treatments for diseases such as cancer and dementia [12]. The UK life sciences sector is therefore important for both the country's economy and the people's health and wellbeing.

1. Centre for Social Justice. "Pillars of Community: Why communities matter and what matters to them" (2021). Available here.
2. University of Southampton, "Life Sciences community". Available here.
3. Local Government Association, "Community Cohesion - An Action Guide," (London: LGA Publications, 2004). Available here.
4. CSJ, "Pillars of Community" (2021). Available here.
5. Porter, M. E., "Clusters and the New Economics of Competition," *Harvard Business Review*, November-December 1998. Available here.
6. Savills "European Life Sciences" (2021). Available here.
7. Fiaschi, M. "The leading life sciences clusters in Europe," (Brussels: Science Business Publishing Ltd., 2015). Available here.
8. UK Government, "Strength and Opportunity 2016" (London, 2017). Available here.
9. GOV.UK, "Bioscience and health technology sector statistics 2020," December 3, 2021. Available here.
10. Ibid
11. Ibid
12. GOV.UK, "Bold new life sciences vision sets path for UK to build on pandemic response and deliver life-changing innovations to patients," July 6, 2021. Available here.

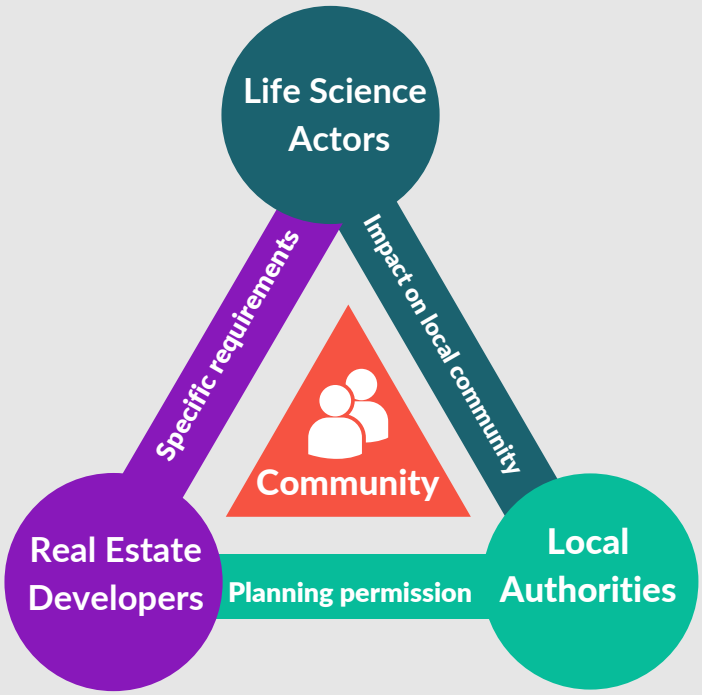
CONTEXT

Life Sciences Real Estate Dynamics

In 2021, MedCity published the results of a survey of life sciences companies, which concluded that this fast-growing sector lacks land to operate in London [1]. This is reinforced by Savills' 2019 analysis of London's life sciences sector. Despite its position as one apex of the UK's life sciences 'Golden Triangle', enriched by the presence of world-leading research universities, diverse healthcare facilities and a globally competitive talent pool, the report diagnoses that "London is lagging" [2]. Out of £2.5bn UK lab and R&D projects set to finalise between 2020-2022, only 5% are accounted for by London - compromised by severe lack of R&D space, wet labs and life science incubators.

A central force driving this lack of space is the specific requirements of life science fit-for-purpose buildings, some of which include additional power supplies, higher-than-average ceilings and structures in place for the safe disposal of associated hazardous waste [3].

In a city defined by lack of space, with a growing population forecast to reach 10 million by 2030 [4], life sciences cannot take a right to space and planning permission for granted. Rather than justifying applications solely on the sector's role in tackling national or global healthcare challenges, local authorities must understand the local dimension of cluster benefits.



Key stakeholders in life science cluster development

Although some of these benefits are translated to the local community simply by the presence of life science activity, there are others that rely on intentional actions from real estate developers, local authorities or life science actors.

REPORT AIMS

1.

Fill the gap in understanding between the three key stakeholders in relation to community within clusters, facilitating communication among them.

2.

Validate community benefit from life science cluster activity, by identifying four key parameters and substantiating their relevancy via literature review and relevant case studies (see 'Methodology').

3.

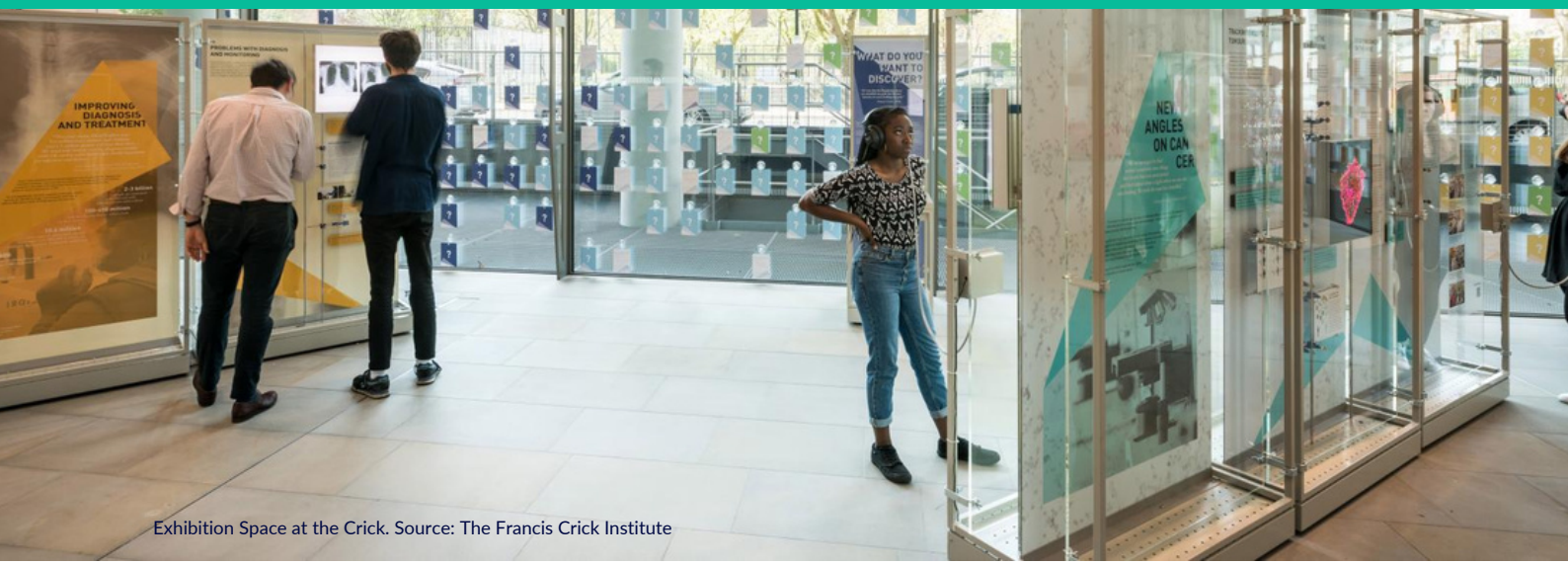
Discern key indicators within each parameter that signify conducive conditions to synergy between life science cluster and community.

4.

Translate key indicators into a conceptual tool, intended for use by key life science actors, both to measure current community benefit as well as in implementing or authorising new life science activity.

1. MedCity. "London Life Sciences Real Estate Demand Report". (London, 2021). Available here.
2. Savills. "Life Sciences: Trends & Outlook." (London: Savills UK Commercial, 2020). Available here.
3. Colliers. "Life Sciences Under the Microscope. EMEA Research & Forecast Report." (2021). Available here.
4. Blanc, F., Scanlon, K., White, T. "How Residents See Their Homes. Living in a Denser London." (London: LSE, 2020). Available here.

PLACE



Exhibition Space at the Crick. Source: The Francis Crick Institute

We understand place as the way individuals and groups give a space meaning. To understand community benefit in this context, research must be rooted in how people interact with the tangible aspects of a life science cluster. If planned well, life sciences real estate will maximise community benefit and involvement. Key considerations are (i) building design, (ii) allocation of space and (iii) sustainability.

BUILDING DESIGN

Under the 2021 London Plan, proposals for buildings above 350 units per hectare must undergo a process of design scrutiny before referral to the mayor [2]. An **independent design review** is strongly advised, undertaken by experts from different fields who can provide building recommendations. Plans can be reviewed in terms of community benefit under this requirement.

Public access to buildings increases inclusivity of life science developments. The **Francis Crick institute** in Kings Cross, London is a good example of this, as the ground floor houses an exhibition space and a café [3]. This space promotes public education about life sciences, and allows for conversations between the public and scientists. Another good example is Science Gallery, King's College London's flagship public-facing facility connecting art, science and health to foster innovation. Science Gallery London's programme brings together King's academics, researchers and students with local communities through exhibitions, events, performances, live experiments, open discussions and festivals, all with scientific engagement at their core.

Motivated by the booming life sciences sector and its demand for space, developers are looking to repurpose derelict buildings to make flexible lab space, as one strategy. This reduces the need to demolish buildings or encroach on land serving public uses. It also leaves buildings malleable for tenants from different sectors over its lifetime.

Unused retail and commercial space offers potential to change the identity of the high street, putting life science into the community sphere alongside hospitality and retail. Yet retrofitting is difficult, especially with specific requirements for wet labs such as extra ventilation. Such high specifications can drive up the cost of refurbishment and make new developments more economically viable [4]. In interviews with local London councils, those making planning decisions indicate they would benefit from **best-practice guidance** on lab building and specifications.

London borough councillors also identify the impact of massing on the community as an important consideration. While a bigger building may be cost effective for a developer it is not ideal if you are a resident in the surrounding community. **Life-science buildings** should therefore be built in a way that is **sensitive to the local communities**, engaging communities in discussion so residents understand the value-benefit of these projects.

ALLOCATION OF SPACE

As a cluster forms, growth can be controlled to ensure that space is assigned to fit a diverse set of needs. Affordability is a key concern for communities in areas undergoing regeneration, as demand for space pushes land price and rents up.

1. Rydin, Y et al., "Shaping Cities for Health" The Lancet 379 no. 9831 (2012): 2079. Available here
2. Mayor of London. "London Plan 2021" (London: Greater London Authority, 2021) Available here
3. The Francis Crick Institute "The Crick opens to the public with its first exhibition" News, 2 November 2016. Available here
4. Blower, S, et al., "EXCHANGE White Paper, Urban Labs", 2021. Available here
5. "Eighty Eight Wood Lane" Imperial College London, Accessed January 18, 2021. Available here

PLACE

Affordable workspace and housing is needed for start-up companies, key workers and surrounding local people. A good example is a sub-cluster in White City, where the planned housing development on 88 Wood Lane has prioritised affordable housing. A portion of the flats are reserved for key workers to rent. Eligibility is decided by maximum gross household income [1].

Research has shown links between urban density and increased physical activity [2]. This has been attributed partly to the ability to walk between sites rather than use transportation. There has been an increasing move towards creating life science 'hubs' within clusters. In a hub, everything is on site: labs, office space, retail and accommodation. Spaces can be made more accessible by creating community spaces and hotspots within clusters. Mixed-use development is seen as a key strategy for cluster growth.

SUSTAINABILITY

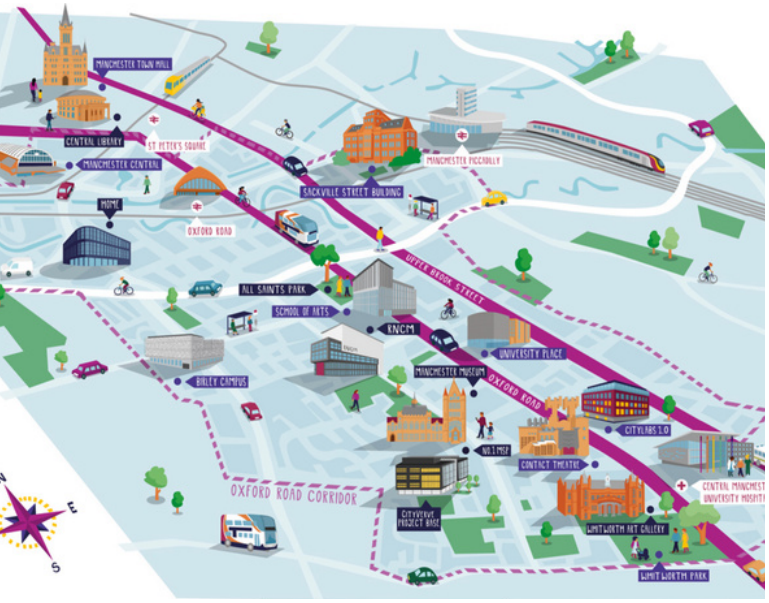
Life sciences R&D activity is contributing to development and adoption of 'green' building technologies that can be used for energy-saving construction, not only making building developments sustainable but also contributing to the community. In Cambridge, UK, Astra Zeneca's Discovery Centre uses natural geothermal energy, saving enough energy to power 2,500 homes.

Communities are increasingly interested in the air quality of their cities. While beneficial to health in general, improved air quality has also been associated with increased physical activity in older adults. Life sciences research in London is actively focused on addressing air quality for local benefit.

A team from Imperial College in West London is working with the local community to monitor the quality of air inside and outside over 100 homes with an asthmatic child selected from across the social spectrum. They aim to identify triggers for worsening of their condition and thus improve quality of life. In a separate project, researchers from Queen Mary University of London are running the CHILL Cognition project to discover whether improving air quality can improve brain development and prevent onset of mental health problems in primary school children. Children from 85 schools are taking part across several boroughs.

CASE STUDY 1: Oxford Road Corridor, Manchester

Manchester's Oxford Road Corridor Partnership was formed in 2007 between universities, hospitals, City Council and the private sector — a collaborative ecosystem considered a UK first. Manchester City Council Leader Sir Richard Leese puts the success and growth of the corridor to the strong culture of collaboration and devolved administration [3].



The city centre stretch of Oxford Road houses one of the largest clinical academic campuses in Europe [4]. This encompasses universities, teaching hospitals, research facilities, cultural and leisure facilities, and green public space. The universities have attracted a young, international population, and the district claims 17% of the city's workforce [5]. Historically, Manchester has lost talent to out-of-town research hubs, or the Golden Triangle, but now has the ability to attract talent. Over the next 10 years the planned investment into the area is estimated at £1.5bn [6]. Much of the development on the Corridor has aimed at preserving the history and architecture of the area, with careful landscaping around the buildings to maximise public space. A large portion of investment has been dedicated to existing cultural facilities in the district.

The council's Strategic Vision for 2025 outlines the following priorities for the Corridor [7]:

- Supporting the entertainment, cultural and leisure industries, alongside Life Sciences
- Landscaping to improve the public realm
- Providing a broader selection of housing to cater for the different needs in the workforce and avoid displacement
- Reducing the carbon footprint of Corridor Manchester and innovating green technology

1. "Eighty Eight Wood Lane" Imperial College London, Accessed January 18, 2021. Available here
2. Rydin, Y et al., "Shaping Cities for Health" 2012
3. Pro-Manchester "What's next for the Oxford Road Corridor Innovation District?" Blog, 19 November, 2019. Available here
4. "Health & Life Sciences", Oxford Road Corridor, accessed 18 January 2022. Available here
5. Bruntwood "Manchester Technology Centre", accessed 18 January 2022. Available here
6. Corridor Manchester's "Strategic Vision To 2025" (Manchester: Manchester City Council) accessed 18 January 2022.
7. Corridor Manchester "Strategic Vision To 2025"

CASE STUDY 2: West Harlem Campus, New York, USA

Despite having one of the largest, most diverse talent pools, NYC loses talent to more established life sciences clusters such as Boston. A Partnership Fund for New York City study in 2001 found that there was an absence of entrepreneurial spirit, collaboration between institutions and sectors, venture capital and lab space [1]. While it is difficult to draw parallels between UK clusters (where policies tend to be driven more locally) and US clusters (that typically receive more central government support) they provide valuable insights.

Change has partly been driven by University-State partnerships, aided by the robustness of the life science sector. The US universities have a long tradition of public service and community engagement in their expansion. This case study looks at Columbia University's development of a new campus in the West Harlem area of Upper Manhattan. Columbia University first extended its campus into Harlem's Mornington Heights in the 1960s, amid resistance from locals and students [2]. Columbia's new plan is to extend its campus further into Harlem to create a research corridor in Manhattanville with the City College, Advance Science Research Center and the New York Structural Biology centre.

Sustainable Design

Columbia's design philosophy is that "an urban campus isn't defined by gates and walls, but by weaving the university into the fabric of city life". The campus has an innovative and ambitious design, with research facilities, a business school and housing for students and staff.

Central to the plan is a piazza-like space, where residents and university can share activities and dialogue. This public area will be filled with trees, public art and street furnishings. The neighbourhood plan was also the first to receive LEED-Platinum sustainability certification [3].

Some local residents were initially suspicious of the development, as many businesses and households faced relocation. Rents and prices in the area would increase for remaining residents, as students and university staff would locate nearby. There was also a concern for the effects on public health of the proposed 30 years of construction, despite the jobs that this would create.

Community Benefit Agreement

After a land and environmental review, the public could voice their views, and negotiate a community benefit agreement (CBA). This is a private agreement between the public and developers [4]. The City Council was in favour of the development, but with public resistance they drew back. The Community Board for Manhattan, created to give the public a voice on developments, was ethnically divided and there was only minor representation from the working-class Dominican community.

The West Harlem Environmental Action (WE ACT) had a large part in mobilising community efforts to obtain the final CBA [5]. The agreement included:

- $160 million to the community, including a $20 million fund to develop or preserve affordable housing
- By 2030 all residents will be relocated to new housing within the area
- The university will provide residence outside of the project area for its students and staff, to reduce demand in the area
- Minimising the impact of negative air quality during construction

1. McCarthy, K et al., "Life Sciences on the Rise: 2021 North American Report" (Chicago, Illinois: Cushman & Wakefield, 2021). Available here
2. Batra, S. "A Case for Developing Life Science Real Estate in New York City" (MSc thesis, Massachusetts Institute of Technology, 2017) 8-9. Available here
3. Manhattanville Factory District", Janus Property, accessed 18 January 2022. Available here
4. Melhuish, C. "The US Models" UCL Urban Laboratory, September 2015. 1-30. Available here
5. Columbia University in Huffman, Lukas. "Manhattanville, Meet West Harlem: An Urban Frontier" 2009. Available here

SUMMARY: KEY INDICATORS for Placemaking

Design of Buildings

- Process of independent design review or equivalent
- Ground floor public access to buildings for education, social or recreational purposes
- Public engagement and negotiation throughout all stages of development planning, with a representative sample from local community

Allocation of Space

- Provide affordable housing and workspace within a cluster, either within a development or nearby
- Increase urban density so that community resources are clustered together and travel distance is reduced
- Create community hotspots: culture and leisure facilities, and free-access space

Sustainability

- Reduce air quality damage during construction and minimise emissions from increased traffic generated from development
- Invest in infrastructure and public transport networks alongside development

JOB OPPORTUNITIES

A central benefit of science clusters and companies to local communities is the opportunity to create meaningful, high quality and diverse-level jobs. These jobs are facilitated both through the direct employment of individuals by life science firms, or through indirect or induced effects, inclusive of the sector's 'knock-on' effects.

DIRECT IMPACT

The most immediate way a life science cluster can generate meaningful change via employment is through direct job creation – roles created that are directly tied to life science related economic and industrial activity. The life science sector employs ~258,000 people within the UK [1]. The 2030 Life Sciences Skill Strategy projects that 133,000 jobs will be created in the next eight years, reflecting the high demand for talent in the sector [2]. This prediction for continued growth reflects sectoral trends over the past decade. In particular, **London** has seen **life science employment increase by 40%** between 2011-2020, from 20,500 workers to 28,700 [3].

I. Accessibility

Ensuring that new jobs created in an area area cater to **diverse qualifications** and skill-levels, is crucial in ensuring that the positive benefits of the cluster are accessible to all people within the local community. As a recent Royal Society report highlights;

"The risk is that, without new jobs being created at all skill levels, spatial inequality in the region will increase"[4].

Whilst direct life science jobs lean towards high skill (Level 6) roles, firms need staff across the skill set mix. From the projected 133,000 life science jobs, **40%** of those do not require a degree [5]. This aligns with research indicating that life science firms prioritise employee practical competencies over academic degree qualifications [6].

To meet this cross-sectional demand and facilitate accessibility for locals, training and educational opportunities such as the UK's Levy Apprenticeship scheme or Maryland's BioBoot Camp initiative in the USA are imperative (see 'Education' parameter). Another example is the London borough of Islington's 'world of work' programme, promising every child in Islington 100 hours of exposure to work before the age of 16 .

II. Job Quality

To validate the quality of life sciences jobs, we can use the **OECD's Job Quality Index [**7]. The framework identifies three key indicators of job quality and employee well-being - ***Earnings Quality***, ***Labour-Market Security*** and ***Quality of Working Environment.***

Both nationally and in London, life science jobs have higher salaries than jobs in other sectors. The average UK science salary is £39,130 [8], compared to a national average of £31,461 [9]. Moreover, the Milken Institute's analysis shows that this pattern isn't driven by disproportionately higher salaries at the top end. Roles at all qualification levels offer higher salaries by degree than the equivalent national average [10].

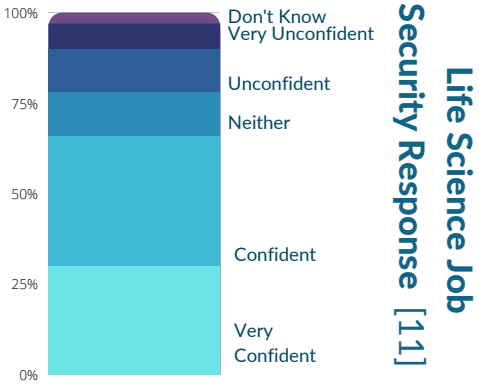
1. HM Government, "Bioscience and health technology sector statistics 2019" (London: UK Government, 2021). Available here.
2. UK Life Science Partnership, "Life Sciences 2030 Skills Strategy" (London: UK BioIndustry Association, 2020) Available here.
3. HM Government,"Bioscience and health technology sector statistics 2019"
4. Royal Society, "Research and Innovation Clusters: Policy Briefing" (London, 2020) 30. Available here.
5. UK Life Science Partnership, "Life Sciences 2030 Skills Strategy"
6. Alissa, D., Kesteven, C., Melass, A., "New Opportunities for Job Creation in Maryland's Life Sciences Industry" (Maryland: The Milken Institute, 2021). Available here.
7. Cazes, S., A. Hijzen and A. Saint-Martin., "Measuring and Assessing Job Quality: The OECD Job Quality Framework" , *OECD Social, Employment and Migration Working Papers*, No. 174 (Paris: OECD Publishing, 2016). Available here.
8. New Scientist, "New Scientist Survey Shows Science Jobs are Long and Fulfilling" Press release, 27 February 2020
9. Office for National Statistics,"Employee Earnings in the UK: 2020". (2020) Available here.
10. 6. Alissa, D., Kesteven, C., Melass, A., "New Opportunities for Job Creation in Maryland's Life Sciences Industry" .

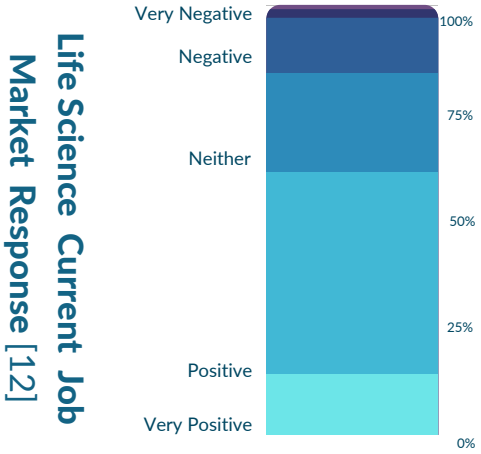
JOB OPPORTUNITIES

Labour Market Security

Identified as a key factor in predicting individual well-being within employment, labour-market job security is at the centre of the OECD Job Quality Index. There are two key dimensions to the indicator - *labour* job security versus *market* job security.

Sectoral research shows that life science roles score well along both axes. When a sample study of European life science workers were asked to score their confidence in their job and in the sector market, the results showed an overwhelmingly strong response in favour of the sector (see graphs below) [1].





This subjective measure of job security is supported by evidence. The life sciences sector has repeatedly demonstrated again and again its **resilience** as a sector to broader periods of economic instability. Due to its central role in combating the COVID-19, the life science sector saw significant employment and economic growth during the pandemic.

Within the Cambridge Local Authority, the sector experienced the highest employment growth out of all industries during the timeframe, with a 10.6% increase in local employment [2]. The sector has also held steady and experienced growth in financially-driven recessions [3].

This sector-resilience is projected to strengthen, as the sector becomes increasingly vital in helping to tackle our national healthcare challenges, most significantly an increasingly ageing population.

Quality of Work Environment

This parameter is inclusive of the chance for workers to **"fulfill their ambitions, to feel useful in society and build self-esteem, as work often represents their main recognised contribution where they live" [4].**

Opportunities for self-progression and up-skilling within the sector are significant - as seen in the 'Education parameter' - fulfilling the first requirement. Due to the nature of life science work in tackling key local and national health issues, sector jobs also score highly in the '**community contribution'** aspect of this indicator.

Deloitte's 2021 study reiterated the **value added** to job satisfaction through **meaningful work** within the life science industry [7]. This factor of job satisfaction is set to become increasingly important, particularly amongst younger generations [8].

1. EPM Scientific. "Global Job Confidence Index" (2021) 34. Available here.
2. Centre for Business Research - University of Cambridge. "Greater Cambridge Employment Update June 20" (Cambridge: University of Cambridge, 2021) 8. Available here.
3. TEConomy Partners, LLC. "2018 Evidence and Opportunity: Impact of Life Sciences in North Carolina" (2018). Available here.
4. Cazes, S., A. Hijzen and A. Saint-Martin., "Measuring and Assessing Job Quality: The OECD Job Quality Framework" 18.
7. Deloitte. "2021 Global Life Sciences Outlook: Possibility Is Now Reality, Sustaining Forward Momentum" (Deloitte Insights, 2021), Available here.
8. Deloitte. "The Deloitte Millennial Survey 2018, Deloitte Insights" (2021) Available here.

JOB OPPORTUNITIES

III. Room for Improvement: EDI

Although the industry has improved in its gender diversity, similarly to other sectors, women still make up a smaller percentage of the workforce (**44%**) with even fewer females holding positions in senior roles (**40%**) [1].

Females in senior positions

The sector has significant work to do in improving ethnic diversity. Again, despite an improving trend, currently Black / African / Caribbean / Black British individuals occupy less than **1%** of roles within the sector [2], despite making up 3% of the total UK population. With the exception of Black or Black British, there is a higher proportion of every ethnic group in SEC 1 than of White scientific workers. This is most marked among Chinese scientific workers (72.0% of whom are in SEC 1 occupations). In contrast, only 29.3% of Black or Black British scientific workers are in SEC 1 – slightly below White (34.5%) and the overall scientific workforce (35.6%)

To make progress, life science firms are actively strengthening practices to promote Equality, Diversity and Inclusion, and fill the current knowledge gap within middle managers to maintain an inclusive working environment [3]. Inclusive outreach is also vital to improve workplace inclusivity (see 'Education' parameter).

INDIRECT & INDUCED IMPACTS

Life science cluster activity offers noteworthy opportunities for job creation in the wider local economy via **induced and indirect job effects.** For every life science job created, **2.5 additional jobs** are formed in the wider economy [4]. This employment multiplier effect is significantly higher than the UK median for industries which falls at **1.66** and can be attributed to the sector's high productivity profile [5].

x 1 life science job **x 2.5 additional jobs**

Indirect and induced impacts also offer an even greater diverse mix of roles, both in the required-skill range and in the nature of the jobs themselves. Whilst **76%** of direct life science jobs are within large companies [6], induced and indirect jobs are mainly based in **SMEs**, supporting local economic growth and local social cohesion [7].

I. Indirect Job Creation

Indirect jobs are those created through the economic activities of the life science sector in the wider economy, for example, through local supply chain procurement and use of local professional services. In a 2015 study, PwC identified that **140,00 direct life science** jobs supported **196,000 indirect jobs** in the UK, via the sector's supply chain [8]. This inflated impact reflects the indirect job creation's strong multiplier effect [9].

196,000 **indirect jobs**

II. Induced Job Creation

Induced impacts include the jobs created by the economic activities of the life science sector employees within their day-to-day life. Following a similar pattern to indirect jobs, a greater number of induced jobs are created in the economy for every direct life science job, with the 140,000 direct employment group supporting **146,000 induced jobs** [10]. Again, given the higher salary and productivity of the sector, this distributive impact is higher than the average multiplier effect, creating more jobs in the wider community.

In contrast to indirect jobs created, induced jobs are mostly **unrelated** to the life science industry's activity, and are usually roles in the food, distribution, and accommodation service, substantiating the reach of cluster merits through strong diversification.

To ensure the local area of the cluster is the core benefactor of induced impacts, it is imperative that the cluster is close to affordable accommodation and attractive amenities (see 'Place' parameter). Facilitating the locality of cluster communities makes it conducive for life science employees to live and spend locally.

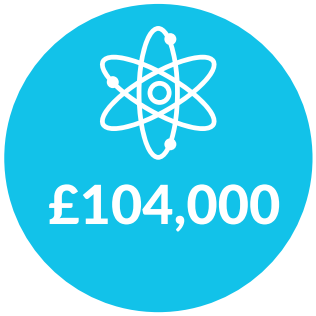
1. Science Industry Partnership. "Life Sciences: Equality, Diversity & Inclusion Report" (2021). Available here.
2. Ibid. 8.
3. Ibid.
4. Royal Society Available here.
5. PwC. "The Economic Contribution of the UK Life Sciences Industry" (2017). Available here.
6. Office for National Statistics. "UK employment multipliers and effects, reference year 2015" (2019). Available here.
7. Office for Life Sciences. "Bioscience and Health technology statistics 2020" (London: UK Government, 2020). Available here.
8. OECD. "OECD SME and Entrepreneurship Outlook 2019" (Paris: OECD Publishing, 2019)
9. PwC. "The Economic Contribution of the UK Life Sciences Industry" 4
10. Ibid. 35

JOB OPPORTUNITIES

WIDER IMPACT

The induced and indirect net benefit of life science clusters extends beyond job creation. Due to the high productivity and higher salaries associated with the sector, the **Gross Value Added** (GVA) to the local and broader community is higher for the life science sector compared to the national average. Higher GVA per employee within a specific area has been linked to **increased living standards** [1] and greater opportunities for wider economic and employability growth.

Average direct GVA per employee [2]



Life Science GVA per employee [3]

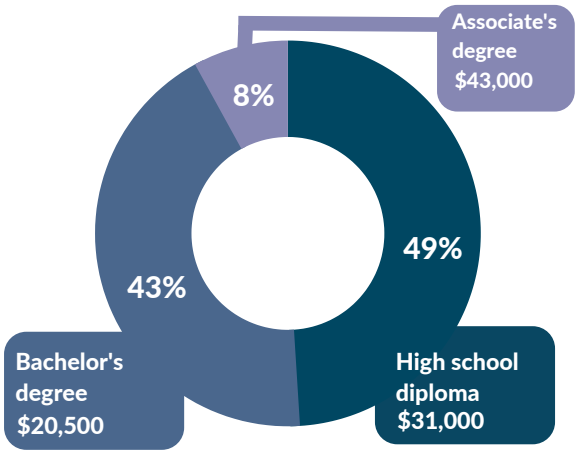
CASE STUDY 3: Maryland, USA

Opportunities for local job creation

Composed of 2,700 life science firms, 74 federal research labs and over 500 biotech companies, the Maryland life science cluster is one of the leading bases in the United States. Through this significant industrial activity, the cluster is responsible for creating vast job opportunities, employing **54,000** people within the state.

The jobs created by the life sciences industry here are diverse in skills-required and are of a high quality, paying above the national median by degree level. **49%** of roles created were accessible to those with **a high school diploma** (UK Level 4) in addition to **8%** that required an **associate's degree** (UK Level 5) [4]. Level 4 equivalent roles offered a median annual income of **$31,000** and those at Level 4 had a median annual renumeration of **$43,000** – both significantly higher than national median wages by degree. These roles include first-line production and operation supervisors, life science technicians and chemical system operators.

As diverse talent demand continues to increase, job creation offers unique opportunities to **mitigate local issues.** Following the fall-out of the COVID-19 pandemic, the state saw a significant increase in local unemployment, driving figures up to **6.2%** [5]. At the same time, as life science activity grew in response to the public healthcare crisis, firms experienced a gap and demand for workers, particularly within practical roles requiring lower qualification levels. Key stakeholders noticed the potential for this **mutually beneficial relationship,** harnessing local talent whilst targeting unemployment through establishing educational up-skilling and training initiatives (see 'Education' parameter).



These initiatives evened the playing-field for local communities and benefitted life science actors by producing an **industry-ready workforce**. The process in Maryland to fully capitalise on local job opportunities is ongoing. Key identified levers for continued success include **increasing awareness** of available training and work opportunities, supporting dedicating **training programmes** and **industry-certified qualifications**, and ensuring that job creation processes are **inclusive of the local population**.

Source: Healthcare Real Estate Insights

1. PwC, "The Economic Contribution of the UK Life Sciences Industry" (2017)
2. Ibid. 5.
3. Ibid. 5.
4. Melissa, D., Kesteven, C., Melass, A., "New Opportunities for Job Creation in Maryland's Life Sciences Industry" (Maryland: The Milken Institute, 2021)
5. Ibid

JOB OPPORTUNITIES

CASE STUDY 4: Cambridge, UK

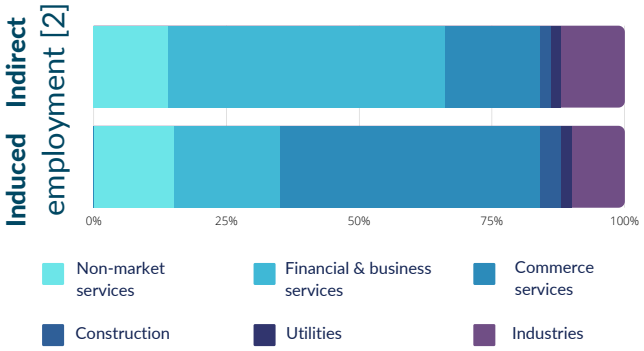
Induced and indirect impacts

The Cambridge, UK life science cluster is recognised as a leading world-class cluster, both as a stand-alone unit and in its position as one apex of the London, Oxford, and Cambridge 'Golden Triangle'. The local cluster boasts over 430 life sciences companies and organisations and annually contributes ~£2.9 billion to the UK economy [1].

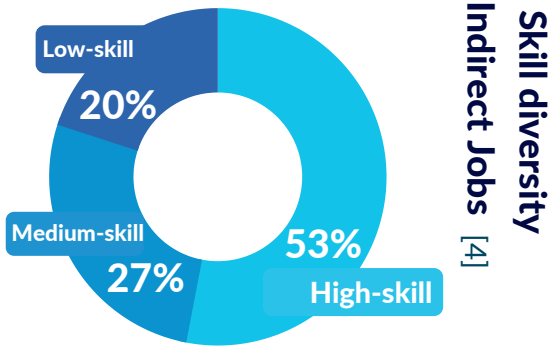
The life science sector is responsible for **13,800 jobs** within the authority, representing **7.4%** of the workforce [2]. However, including indirect and induced effects increases this figure by 83% to 25,300 jobs [3], demonstrating the sector's strong multiplier effect on local employment.

83% **increase in jobs**

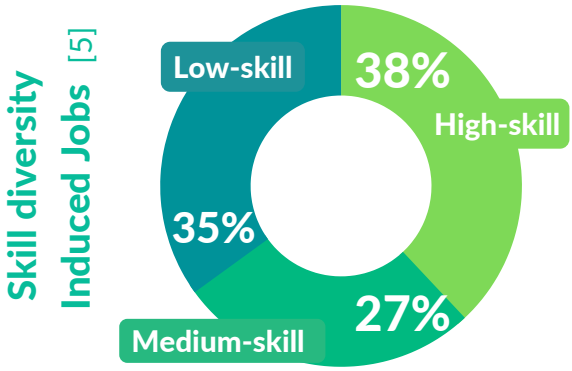
Key to the locality of this spill-over effect was use of **local supply chains** and **services,** capturing larger parts of the local economy.



For indirect job creation, the **main sectors** targeted were Financial & Business Services and Commerce Services. In turn, induced job creation was mainly seen in the consumer service sector, with the highest impact included in the Distribution and Accommodation and Food Services.



The **skill-levels** of jobs created via induced and indirect impacts in the Cambridge life science are **variegated,** diversifying the economic engagement of life science clusters with local communities.



CASE STUDY 5: LIFT, London, UK

Diversifying skillsets

The LIFT initiative — Leading Inclusive Futures through Technology — was launched in 2021 as a collaboration between the London boroughs of Camden, Islington, Tower Hamlets and Hackney.

The four-year programme is aimed at helping locals get jobs and education in digital, sciences, tech and creative production, and to support businesses and start-ups in these sectors. It is the first such scheme in the UK to focus on the "knowledge economy". LIFT will actively seek out employment and training opportunities from leading digital and tech firms and will particularly focus on developing the talents of underrepresented residents, especially women and Black, Asian and minority ethnic communities. One example is creation of a new digital hub in Tower Hamlets to provide quality mark training and bespoke support to help newly skilled people.

The initiative also aims to secure new affordable workspace for businesses in the knowledge 'hubs' across the four boroughs — the Knowledge Quarter in King's Cross, the Cally Road area, Silicon Roundabout in Old Street and Whitechapel's life sciences cluster.

1. Institute of Public Health - University of Cambridge, "The Cambridge Bioscience Impact Assessment Study" (Cambridge: The University of Cambridge, 2015).
2. Ibid. 35.
3. Ibid. 37.
4. Ibid. 38.
5. Ibid

JOB OPPORTUNITIES

SUMMARY: KEY INDICATORS for Job Opportunities

Direct Jobs

- High-quality jobs created at all skill-levels
- Facilitating access to roles through diverse skill-range up-skilling and training courses
- Strong Equality, Diversity & Inclusivity practices

Indirect Jobs

- Prioritise local supply chains and procurement to capture indirect job creation

Induced Jobs

- Strong relative renumeration for all-levels of job
- Affordable accommodation and rich amenities to ensure life science employees can live and spend locally

EDUCATION & TRAINING

Life science clusters can strengthen their local communities through the many opportunities they are able to offer in education, training, and up-skilling. The partnership between education and industry is a crucial part of any life science cluster, and fostering this collaboration is beneficial for all stakeholders, as well as the wider local community.

The life sciences sector has both high supply and demand for skills [1]. As such, life science clusters are well positioned for building connections with educational institutions, offering opportunities for engagement that bring value to the local community [2]. Such opportunities include training, up-skilling, mentorship, or internship schemes. These programs can reach people of all ages and occupations, such as university students, school students, and job-seekers. Their benefits impact those offering and receiving education, as well as the wider community.

UNIVERSITY OUTREACH

Universities are often the anchors of successful life science clusters, contributing to research, education, and innovation. Recent trends include the increasing permeability of the university campus (see Place parameter), facilitating connection with the surrounding community. As places of innovation and entrepreneurship, the number of start-ups spinning out from universities in the UK has been increasing, with around 30,000 employed [3], leading to higher engagement with stakeholders surrounding the university campus.

Practical skills relevant in the workplace are often lacking in standard university education, hindering student transition from campus to the workplace. This gap between graduates' theoretical and practical knowledge – often referred to as '**practice shock'** or '**transfer shock'** also **affects their employers** [4].

The life science sector can play a crucial role in bridging this gap, through mentoring, training, and internship schemes.

I. Apprenticeships

The number of **science-related apprenticeship**s offered have increased in past years, providing valuable work experience for students [5]. These students become more fit to work for later employment, relieving their employers. Increasing apprenticeships available for students is also part of the UK Government's vision for the life sciences, as supported by the Apprenticeship Levy [6].

Apprenticeship schemes can effectively provide routes to direct jobs for people without life sciences backgrounds. Under Scotland's Modern Apprenticeship initiative, apprentices gain qualifications leading directly to jobs such as junior laboratory assistant technician and laboratory trainee. Alternatively, qualified apprentices can choose to further their education at college with an NC or HND in chemistry or a related subject, or apply to university for a science degree [7].

Similarly, the UK's Science Council offers apprenticeships that combine structured study and work experience leading to one of four qualifications: Laboratory Technician (leads to RSciTech), Laboratory Scientist (leads to RSci), Science Manufacturing Technician (leads to RSciTech/EngTech), and Science Maintenance Technician [8].
[**See Appendix for Apprenticeship resources**].

1.UK Life Science Partnership. "Life Sciences 2030 Skills Strategy". Available here.
2. CSJ. "Pillars of Community" (2021). Available here.
3. Blower, S, et al., "Urban Labs", 2021. Available here.
4. Geirdal, A. O., Nerdrum, P. and Bonsaksen, T. "The transition from university to work: what happens to mental health? A longitudinal study," *BMC Psychology* 7, no. 65 (2019). Available here.
5. UK Life Science "2030 Skills Strategy".
6. GOV.UK. "Life Sciences Vision" (London: UK Government, 2021). Available here.
7. Apprenticeships.Scot. Available here.
8. ScienceCouncil.org. Available here.

II. Mentoring programs

Support can be offered to university students by life science professionals through mentorship schemes. University-based innovation and entrepreneurship plays a key role in the life science sector. Support and encouragement of young entrepreneurs is therefore of interest to both the mentors and mentees. Studies have shown that entrepreneurs found support programmes (such as mentoring or networking) valuable, even when these did not address all their needs [1].

This becomes especially significant in addressing disparities faced by entrepreneurs that are female and/or from ethnic minority backgrounds in the UK [2]. Inclusive support programs can contribute to diversifying the sector, as well as stimulating innovation and growth.

Community impact

- **Opportunities for inclusive engagement**
- **Bridging gaps and crossing boundaries**
- **Strengthen sense of connection and belonging**

ENGAGING SCHOOL STUDENTS

Another opportunity for engagement between the life science sector and its local community is through offering programmes for school students. The life science sector has a great interest in fostering the next generation's aspirations in science, technology, engineering, and mathematics (STEM).

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Engaging with children and youth to inspire aspirations in STEM fields is a priority of the life science sector.

Such engagements can be one-off events or long-term programmes. However, studies have shown that deeper forms of engagement are more impactful [3].

Durham University, for example, started a programme for young people to become science ambassadors within their communities [4]. Here, young people are encouraged to engage with and inspire their families and peers.

The New York based partnership 'Urban Advantage' combines classroom resources with workshops and experiences outside of the classroom [5]. The Science Capital Teaching Approach supports teachers in the UK in making the existing science curriculum more engaging and interesting [6]. Other programmes in the UK have given older students opportunities to engage in professional research projects.

In London. school students are being inspired to explore STEM careers through In2scienceUK. Founded in 2010, the non profit programme provides young people from low-income and disadvantaged backgrounds an opportunity to gain practical insight into the STEM sector as well as the knowledge and confidence to progress to university. Each year around 500 students take up STEM placement opportunities, working alongside researchers and industry professionals to get hands-on STEM experience over the summer school holidays. The charity estimates that around 75% of students go on to pursue STEM careers [7]. Based on this success, the In2Science programme has scaled up to encompass towns and schools across England.**[See Appendix for resources on STEM engagement].**

Community impact

- **Most effective forms of engagement are long-term rather than one-off events, making them opportunities to foster long-term connections**
- **Outreach programs affect the whole network of children's learning environment: peers, teachers, parents and beyond**
- **Programs can be designed to focus on reaching disadvantaged students, and are opportunities for more inclusive and diverse engagement**

1. Archer, M. et al "Going beyond the one-off: How can STEM engagement programmes with young people have real lasting impact?" Research for All (UCL Press, 2021). Available here.
2. Ibid
3. Ibid
4. Yusuf, J. "Meeting entrepreneurs' support needs: are assistance programs effective?" Journal of Small Business and Enterprise Development 17, no. 2 (May 2010). Available here.
5. British Business Bank, "Alone together: Entrepreneurship and diversity in the UK". Available here.
6. UK Life Science Partnership. "Life Sciences 2030 Skills Strategy". Available here.
7. In2Science UK. Available here.

EDUCATION & TRAINING

SUPPORTING JOBSEEKERS

A third group of people in the community that can benefit from cluster-led educational opportunities are those aiming for a career in the life sciences, including those whose employment has been affected by the pandemic. Training and up-skilling courses prepare participants for entry-level jobs in the industry by providing the necessary skills and support [1]. These programmes can be tailored to build on previous work experience of participants (see more on the talent pipeline and job creation in the 'Jobs' parameter)

Community impact

- **Increased accessibility to jobs can increase social inclusion in community**
- **Relationships and connections formed through initiatives**
- **Increased employability facilitates greater sense of stability and security**

What role does inclusivity play?

The benefits of these different programs have a strong relationship with the inclusivity of the sector and the wider community. Educational opportunities can target disparities **within** the life science industry affecting women and people from ethnic minority backgrounds. By addressing in-sector inequalities through educational opportunities, **wider societal inequalities** can be addressed through social and economic mobility. Moreover, the opportunities for engagement foster **connections** across groups of different age, background and skill-level, making the community less divided. Members of the local community who are less involved in decisions about life science real estate gain opportunities for **increased agency, engagement** and **stability** [2].

1.Archer, M. et al "Going beyond the one-off: How can STEM engagement programmes with young people have real lasting impact?" *Research for All* (UCL Press, 2021). Available here.
2. Ibid

CASE STUDY 6: The Francis Crick Institute

The Francis Crick Institute in the King's Cross area in London is a leading example of collaborative biomedical research. Building on a partnership of London universities and other organisations involved in research, medicine and the life science industry, collaboration is at its core. Additionally, engagement of the public is one of their strategic priorities [1]. There are many opportunities to visit the institute, including exhibitions presenting and explaining latest discoveries made. Beyond this, there are several schemes to engage both school and university students in the local community.

Students at all levels can find opportunities to benefit from the knowledge, skills and experiences the institute has to offer:

- Summer internships and placement years are available for undergraduates.
- These undergraduate and master-targeted projects can be hosted at the laboratories and/or by research groups.
- PhD programmes are run by the institute and its partners.
- Camden school students can gain work experience, both in research laboratories and other areas (e.g. IT or public engagement) [2].
- Interactive activities and events take place in schools and at the institute for school children of all ages [3].

With many schools, universities and colleges in proximity, the Francis Crick Institutes' programmes for students offer unique opportunities for connections and interactions between different members of the local community.

In 2019/20, 93 students gained work experience at the institute and 16,000 school students within the area took part in programmes offered [4].

CASE STUDY 7: Maryland, USA

Maryland is one of the main centres for life science companies and research institutions in the USA. Several **state-supported programmes** in Maryland promote training and up-skilling schemes [5].

EARN Programme

The **EARN** (Employment Advancement Right Now) programme in Maryland aims to remove barriers to employment by addressing the needs of both the industry and the worker [6]. Training programs are designed in close collaboration with employers themselves, ensuring that the up-skilling fulfills the specific requirements of the job [7].

Biotech Boot Camp

Biotech Boot Camp is a four-week, tuition-free course specifically reaching people affected by the pandemic, equipping them with skills needed for entry-level jobs in the life science industry [8]

Beyond technical skills, support is offered in writing resumes, and other more personal challenges. Annica Wayman, one of the organisers of the training, speaks about "personal connections" she has formed with students of the pilot programme [9]. The effects of the programme appear to go beyond the economic benefits of both employer and employee.

1. The Francis Crick Institute, "Careers & study". Available here.
2. The Francis Crick Institute, "Education outreach". Available here.
3. The Francis Crick Institute, "Annual Review". Available here.
4. Dubetz et al, "New Opportunities for Job Creation". Available here.
5. Maryland Department of Labor, "What is EARN Maryland?". Available here.
6. O'Leary et al, "Job-centric upskilling". Available here.
7. Hansen, S. "UMBC launches Biotech Boot Camp to train workers displaced by COVID-19 for in-demand jobs," UMBC News, February 25, 2021 Available here.
8. Ibid
9. Ibid

EDUCATION & TRAINING

SUMMARY: KEY INDICATORS for Education & Training

Reaching University Students

- Apprenticeship schemes offering students work experience
- Mentorship schemes for young entrepreneurs
- Programs focussing on supporting female and ethnic minority background students

Engaging School Students

- Opportunities to get engaged outside of school, e.g. through workshops or work experience
- Supporting schools with resources to make the science curriculum more engaging
- Long-term programmes that build connections with local schools

Supporting Job Seekers

- Training schemes preparing local residents for entry-level jobs in the life sciences
- Upskilling programmes allowing employees to take on higher level jobs

HEALTHCARE

I. Introduction to healthcare and innovation in communities

"We will work together to proactively increase the racial, age, gender, and geographic diversity of clinical trial participants and those in real world data sets" - HM Government [1]

This desire for a more inclusive approach to scientific and health research from communities across the UK echoes the dynamics developing in the life sciences sector and in the clusters that conduct the majority of research in this area. Indeed, there is a desire for the inclusion of local communities in medical research processes and clinical trials. Clusters develop the goal of innovating to directly impact the community.

Community innovation" [2] or "community research", i.e. inviting ordinary citizens, affected by diseases and conditions, to participate in trials, tests and therapies, has been shown to be successful in improving participants' health [3].

Promoting community inclusion in the health and research system is a way to improve their well-being and health. It is also an opportunity for systematic change, which can redefine the power dynamics between industry and the local community, between whom the exchange is often opaque.

Some factors preventing personal involvement in healthcare include age, gender, religious beliefs and cultural values, as well as lack of access to digital technology and knowledge and understanding of health mechanisms or their condition [4]. These factors can be overcome by different ways of involving the patient experience in research, notably through our two main examples (PPI and Biobanks).

Clusters are now implementing proactive actions to value and include in research the personal and lived experience of patients affected by certain conditions. These measures allow the implementation of a **dialogue** between the community, especially those erased from the health system for socio-economic reasons, and the professionals working in the clusters [5].

In increasingly populated cities, health systems are becoming more complex and large-scale. Inclusive actions are difficult to implement with the goal of meeting the diverse needs of cosmopolitan metropolitan communities. In London, the UCL x Lancet commission highlights the relevance of **small-scale interventions** to involve the community in the process of their health, rather than trying to involve them through broad policies [6]. They argue that it is more impactful to plan local actions, at borough-level, rather than at the national level. This approach echoes the fact that inviting **public participation** in scientific research is more than ever pertinent to local communities.

II. Public Patient Involvement

What can Public and Patient Involvement look like in the life sciences industry?

→ **Personalised care, treatments and support therapies:** an individual patient will interact with their GP who will lead the patient towards other professionals relevant to their healthcare needs. (Example: A House of Care)

→ **Social Prescribing:** inviting patients to connect with non-medical community resources. (Example: Ways to Wellbeing by York Centre for Voluntary Service).

1. HM Government, "Life Sciences Vision: Build Back Better, Our plan for growth", (2021). Available here.
2. Van Oost, Elizabeth C.J, Stefan Verhaegh, and Nelly E.J Oudshoorn. "From Innovation Community to Community Innovation: User-initiated Innovation in Wireless Leiden." Science, Technology, & Human Values 34, no. 2 (2009): 182-205. Available here.
3. Cheuy S., "The community innovation imperative", Tamarack Institute, (undated), Available here.
4. Mercury Healthcare, "Patient Engagement", Mercury Healthcare, (Undated), Available here.
5. Mercury Healthcare, "Analytics Solutions", Mercury Healthcare, (Undated). Available here.
6. Rin, Yvonne, et al.. "Shaping Cities for Health: Complexity and the Planning of Urban Environments in the 21st Century." The Lancet (British Edition) 379, no. 9831 (2012): 2079-108. Available here.

→ Self-Management: long-term interactions with healthcare professionals.

→ Shared decision-making: the patient is given a range of possible treatments and discusses with professionals which one they want to choose.

→ Personal & Health Budget: patients plan and discuss with professionals the budget allocated to their healthcare [1].

→ Clinical research: Observational
(researchers bring together volunteers to collect data over time without intervening)
Clinical trials: ways to interfere with diseases through experiments e.g. drug testing, surgical interventions, new treatments)

→ Community Based Participatory Research: one response to addressing representation disparities in research is to train a local representative of the community to report and interact with researchers, as well as having scientific representatives in the community [2].

What are some proven direct effects of PPI?

Key fact: Patients involved in their healthcare are twice as likely to ask for medical help in time and three times less likely to have medical needs unmet. [3]

- Improves quality of life [4]
- Improves effectiveness, efficiency and quality of health services [5]
- Reduces admissions to hospitals [6]
- Develops health literacy [7], and knowledge on patients' own health and well-being [8]
- Patients involved in their healthcare reported greater satisfaction, fewer complaints, regrets and doubt about healthcare
- Patients who are given choice and control over their treatment seem to benefit more from it [9]
- The mere act of participating in healthcare processes helps to rehabilitate patients (beyond consultations, treatment and advice seeking…) [10]
- Addresses and rebalances power imbalances between clinicians and patients
- Makes the voice of the community a priority that can not be ethically ignored

- Addresses and rebalances power imbalances between clinicians and patients
- Makes the voice of the community a priority that can not be ethically ignored

How to implement PPI that resonates with the local community?

→ Digital trials & telehealth: to include vulnerable people not able to travel to the cluster. [11]

→ Technology: real time data monitors real time effects and side-effects in a practical way. [12]

→ Flexible hours: include people who have work scheduling conflicts or caregiving duties. [13]

→ Implementing advocates for PPI: executive level dialoguing with the community is proven to make the community feel heard [14].

→ Involve the community in prioritising what kind of research is conducted in the first place. Patients can also be trained to be advocates for their own healthcare needs [15].

1. Wallerstein, Nina B, Duran, B., "Using Community-Based Participatory Research to Address Health Disparities." Health Promotion Practice 7, no. 3 (2006): 312-23. Available here.
2. Bombard, Y., *et al.*. "Engaging Patients to Improve Quality of Care: A Systematic Review." Implementation Science : IS 13, no. 1 (2018): 98. Available here.
3. Hibbard, J. H., Greene, J.,. "What the Evidence Shows about Patient Activation: Better Health Outcomes and Care Experiences; Fewer Data on Costs." Health Affairs 32, no. 2 (2013): 207-14. Available here.
4. Bombard, Y., "Engaging Patients to Improve Quality of Care: A Systematic Review."
5. ibid.
6. ibid.
7. ibid.
8. Hibbard J.H., Greene, J. "Evidence about patient activation".,
9. NHS England, "Involving People In Their Own Health And Care".
10. Vahdat, S., et al.. "Patient Involvement in Health Care Decision Making: A Review." Iranian Red Crescent Medical Journal 16, no. 1 (2014): E12454. Available here.
11. JLL. 2020 Life Sciences Real Estate Outlook: Fueling Biopharma And Med Device Innovation. JLL, (2020). Available here.
12. Deloitte, 2021 Global Life Sciences Outlook: Possibility Is Now Reality, Sustaining Forward Momentum, Deloitte Insights (2021), Available here.
13. ibid.
14. NIHR Research Design Service London, "Understanding patient and public involvement", Youtube Video, 3:36, (2019).
15. Vahdat, S., et al.. "Patient Involvement in Health Care Decision Making: A Review."

CASE STUDY 8: Beth Israel Deaconess Medical Center

The **BIDMC** is part of the Beth Israel Lahey healthcare system in Boston, Massachusetts, USA. It is a teaching hospital of the Harvard Medical School. The Beth Israel Lahey system is composed of many medical centres and hospitals, with 35,000 employees and 4,000 physicians, forming a cluster focusing on healthcare, research and education in the life sciences.

The centre is part of the world leading life sciences cluster of Massachusetts, and the leading cluster in the USA, based on National Institute of Health funding, venture capital funding, patents created, lab space available and jobs created. The BIDMC also recently participated in the research that led to the Johnson & Johnson coronavirus vaccine.

Concrete actions taken by the cluster to implement PPI [1]:

- Patient care committee responsible for leading patient and family advisory council
- Involved hundreds of patient and family advisers in focus groups and meetings around design changes and other institutional projects
- They increased flow in the spine center, planned a new cancer center and implemented "time out" spaces for family of patient in intensive care units
- Developed their online portal for PPI called "Patientsite.org" giving access to their clinical records and the medical team's notes
- Created a response tool for family members to express concerns about a patient's behaviour and request a review by the centre's team
- Translation support groups for Chinese and Spanish-speaking patients

These actions led the BIDMC to score highly on most of the criteria of the Institute for Family-Centered Care's Hospital Self-Assessment Inventory. These results were attributed to the hospital being more patient-centered.

Source: Quest Oracle Community

Observed outcome on patients [2]:

- *Reduced the "harm" effect (negative effects of healthcare on the patient) from 22.5% to 11.5% during the 2006-2010 period*
- *From 2010 to 2011, surgical site infections went from 79% to 47%*
- *Reduced the rate of unexpected death by 80%*
- *Out of 11,797 patients that were given access to their health records, 77% to 87% felt more in control of their healthcare and 60% to 78% related that to increased medication adherence*

1. Laurance, J., et al. "Patient Engagement: Four Case Studies That Highlight the Potential for Improved Health Outcomes and Reduced Costs." Health Affairs 33, no. 9 (2014): 1627-634. Available here.
2. ibid.

CASE STUDY 9: Barts Health Biobanks

About the Whitechapel cluster

→ Focuses on biobanks in genomic research.
→ 3 national biobanks.
→ Located in Whitechapel, Tower Hamlets, the third poorest borough in England.
→ Local health problems that the genomic banks study: cancer, cardiovascular disease, chronic lung disease. [1]

Barts Health East London Genes & Health Project:

- Over a million participants from East London.
- Aims to improve the local health of Pakistani and Bangladeshi communities in relation to diabetes, which is prevalent among those populations.

David van Heel, the project's chief investigator, emphasises the importance of proximity of some participants to the research centres. He notes that the British-Bangladeshi and British-Pakistani communities have a much higher response rate in face-to-face communication [2]. He thus confirms the capacity of health and research centres to build a dialogue that can make patients more invested in their health. This project highlights the growing importance of biobanks as a means of improving the health of local and invisibilised populations.

III. Gaining a deeper understanding of public and communities' health: the importance of biobanks.

What are biobanks?

- Collections of biological material and data from living organisms, most prominently from humans, for research.
- Their goal: identify biomarkers in the evolution of diseases
- Support improved accuracy of diagnosis and the understanding of conditions
- When treatments do not exist, patients participate in research focusing on creating the most accurate treatments [3]

How does the community benefit?

Most patients join biobanks with the hope of gaining a **better understanding** of their disease and access treatment options. Participating in biobanks reinforces the feeling of closeness and mutual benefit between the scientific industry and the local community, which understands the impact it can have on research. [4] Furthermore, successful research on specific diseases, such as cancer, depends partly on access to biobanks. [5]

Prioritising biobanks in life sciences clusters increases the chance of local participants having their medical needs met. They provides invaluable and actionable insights on local and global health, ready to be translated to the communities.

Better representation

Biobanks are also a tangible way of **addressing** the **lack of inclusiveness** and **representation** of different ethnic populations. In the UK, Black, Chinese, Pakistani and Indian people were underrepresented by about a third in biobanks (compared to their representation in the 2011 UK census) [6].

Encouraging minorities to take part in these initiatives responds to the common needs of local communities and authorities to create a health system where the needs of all people are heard and addressed.

1. Peiró-Chova, L., et al. "Chapter 2 - The Importance of Biobanks in Epigenetic Studies." In Epigenetic Biomarkers and Diagnostics, 19-35. Elsevier, (2016). Available here.
2. Pellegrini, I., et al. "Contributing to Research via Biobanks: What It Means to Cancer Patients." Health Expectations: An International Journal of Public Participation in Health Care and Health Policy 17, no. 4 (2014): 523-33. Available here.
3. Riegman, P., et al. "Biobanking for Better Healthcare." Molecular Oncology 2, no. 3 (2008): 213-22. Available here.
4. Fry, A., et al. "Comparison of Sociodemographic and Health-Related Characteristics of UK Biobank Participants with Those of the General Population." American Journal of Epidemiology 186, no. 9 (2017): 1026-034. Available here.
5. Barts Life Sciences, "Diversity - Barts Life Sciences", *Barts Life Sciences*, accessed 18 January 2022, (undated), Available here.
6. Muir, R., "Huge Genetic Databases Are Hurting Marginalized People'S Health". Massive Science, *Massivesci.Com*, (2019). Available here.

HEALTHCARE

SUMMARY: KEY INDICATORS for Healthcare

Dialogue

- Representatives of both the local community in research teams and of the scientific community within the local community
- Including patient and local community representation in decision making process on what research should be prioritised, and what infrastructure they need in the cluster
- Patient engagement in every step of the research by clearly informing them of the aims and evolutions of the project

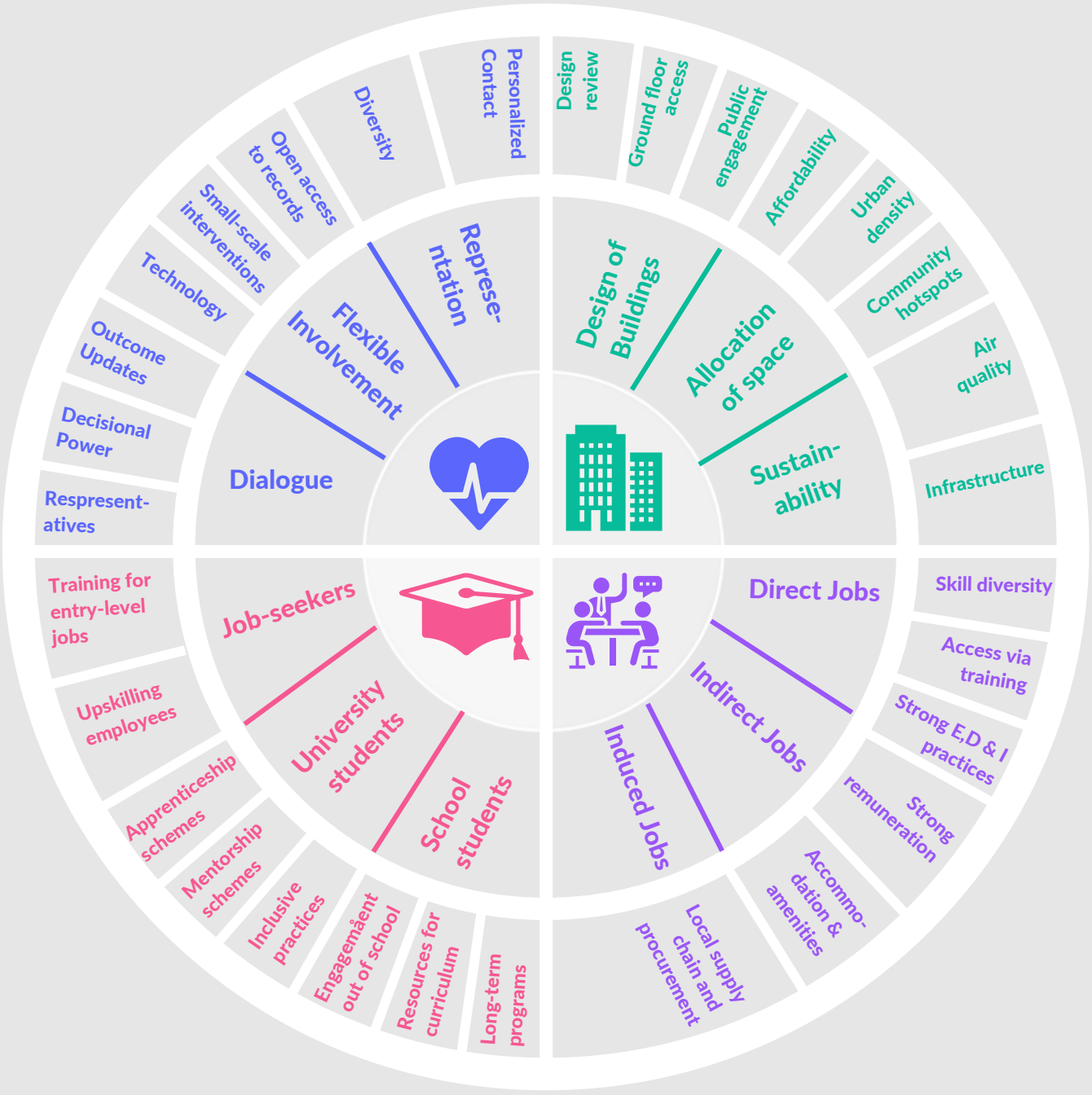
Flexible involvement

- Use of technology to give patients more flexibility in their involvement
- A focus on concrete projects that involve the community
- Provide patients with access to their healthcare records and treatment options

Representation

- A diversity of people of different ethnic groups, age, and genders in research notably to make sure projects are created and tested for under-represented populations
- Implement different ways of interacting with communities to resonate with a diversity of people (mix of online invitations, face to face exchanges, letters, etc.)

Indicator Chart



Place-making

Education

Job Opportunities

Healthcare

Appendix

Apprenticeship schemes for life sciences

https://www.apprenticeships.gov.uk/apprentices/browse-by-interests/health-science#

https://www.rsb.org.uk/careers-and-cpd/careers/apprenticeships

https://www.gradcracker.com/search/science/degree-apprenticeships

https://www.ratemyapprenticeship.co.uk/science-pharmaceuticals-apprenticeship

https://apprenticeshipguide.co.uk/apprenticeships-by-school-subject/science-2/

https://www.britishcouncil.org/sites/default/files/the_uk_technical_and_vocational_education_and_training_systems.pdf

Resources for promoting STEM education in schools

https://www.allaboutstem.co.uk/

https://www.stem.org.uk/about

https://wellcome.org/sites/default/files/making-stem-happen-in-secondary-schools-wellcome-2012.pdf (Welcome trust article on promoting STEM in schools)

https://in2scienceuk.org/

https://www.education-ni.gov.uk/articles/stem-strategy (STEM strategy advice)

Podcasts to stimulate STEM interest

https://mashable.com/article/best-science-podcasts

The Academinist (equality in STEM)

Fly in the Lab (amusing anonymous lab stories)

Stuff you should know

Ologies – covers a lot of science ologies

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ENQUIRIES

If you would like to know more about MedCity's advisory work on life sciences cluster development, please get in touch here.

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