

SPARK OR STIFLE

The story of science, cities, and a sector in flux.





Has the UK stalled when it comes to creating strong urban science clusters?

Like scientific breakthroughs, it seems there's no hidden method.

What we do have, though, is a group of smart insightful people, who brought us closer to the answer...



They talked. We listened.

And now it's time to turn over the conversation to you.





Clusters: what we know.

Constellations of intellect and innovation



Science cluster creation

Crucial elements:

Transport links Networking opportunities Amenities Social spaces Housing

"The most successful clusters - which may appear to have developed organically – represent intentional thinking on the part of their stakeholders."



Once a cluster starts to form, momentum builds. It lures investors and companies. It spawns a gravitational force of its own.

Yet cities' very popularity can become their downfall.

Infrastructure struggles to keep up with exponential population growth.

Rising rents and the escalating cost of living drives out talent...

It's a conundrum we must overcome to create thriving UK science clusters.



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Science over a flat white. The urban allure.

- Smart cities and high quality of life attract talent

- Evolving infrastructure is creating synergies between cities and scientists

- City ecosystems support commercial success

COMMUNITIES OF COMPANIES

Questions of quality of life and community have become as vital to decision-making as technical ones.

In 2013, experiencing a slump in profits and a weak pipeline, AstraZeneca moved its operations to Cambridge from Macclesfield in Cheshireⁱⁱ. Its press release announced that the move would give it the key ingredients of an urban cluster: "easy access to scientific talent and excellent collaboration opportunities through renowned academic research institutions, pre-eminent hospitals and leading-edge biotech companies."

JLL's Glenn Crocker explains: "The influence of co-working companies like WeWork on the working environment has made a significant difference. People now see these funky, interesting places and that's where they want to work. Gone are the days of sterile, hospital-like office environments."



"Increasingly, people are looking for community. They're looking to be part of something bigger, and not be isolated in a single building, or in a business park somewhere. You're building communities of companies, as opposed to single entities."

Glenn Crocker, UK Head of Life Sciences, JLL

THE CITY AS LABORATORY

Another benefit of urban clustering is the opportunity for the city itself to act as a laboratory space for scientific research. For instance, smart cities — underpinned by wearable connected devices such as Fitbits — can provide field research for wide-scale digital health developments.ⁱⁱⁱ

Dame Ann Dowling, Professor of Mechanical Engineering at the University of Cambridge and author of a UK report about research collaboration between businesses and universities,^{iv} believes cities can provide the environment to test and demonstrate new technologies.



"There are many examples of cities using their own infrastructure to support innovation, helping to get new technologies from the laboratory into fullscale implementation."

Dame Ann Dowling, Professor of Mechanical Engineering, University of Cambridge

SMART CITY, SMART PEOPLE

In Cambridge Massachusetts' Kendall Square neighbourhood, more than 30 companies line the street. A mix of big firms, small companies and start-ups, they sit close to Harvard University, MIT and several top-tier hospitals.

"It's been the epicentre for the biopharma industry for a number of years," says Gary S. Gray, Director of Technology and Innovation at Harvard Catalyst, the Harvard Clinical and Translational Science Center. "You're always running in to someone you know, so you can start conversations."

By creating a virtuous circle of innovation and new infrastructure, cities become smarter and deepen their appeal. **Top universities by capital raised by their spin outs 2013-17** Source: Global University Venturing



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MASSACHUSETTS INSTITUTE OF TECHNOLOGY **\$906m**

UNIVERSITY OF OXFORD

\$1,271m

IMPERIAL COLLEGE LONDON **\$714m**



UNIVERSITY COLLEGE LONDON **\$393m**



The cluster conundrum. Balancing the benefits.

- Major cities are short of affordable housing and **R&D** facilities

- Talent and start-ups will follow the money, creating risks for established urban hubs
- UK Government support is imperative



ECONOMIC APPEAL

36.4% of life sciences companies base their location decisions on recruitment needs.^v

The larger and more dynamic the city, the more it will appeal to highly skilled workers. Yet the accumulative nature of the most successful urban science clusters places significant demands on space in these cities.

Attractiveness drives up the price of private housing and commercial properties, which can threaten the city's competitive advantage.

"There are real economic challenges in creating research spaces in London, where real estate costs are high," says Sarah Haywood, Executive Director of MedCity, which promotes the greater south east of England as a health science hub.

Real estate in London's Silicon Roundabout area is already considered to be prohibitively expensive, and is driving out the youngest, most flexible, and most creative entrepreneurs.vi "London, although often the ideal location, is definitely an area where I've found it is difficult to find affordable space that suits the needs of biotech start-ups," says Freddie Dear, Partner at Syncona Investment Management Ltd in London.



FLEXIBILITY AND FUNDING Despite all this, a city location is still "the most desirable location" for large corporate companies to set up their R&D facilities.

"In the early stages of the companies we build, proximity to the founding academics is incredibly important as they are heavily involved in setting the scientific agenda for the company."

Freddie Dear, Syncona Investment Management Ltd

John Sommerville, Managing Partner at Creative Places, explains: "The real estate cost is outweighed by the benefits they get from recruiting and retaining the best people and the interactions they can have with others in these locations."

John adds that the coworking model partly addresses the issue of rising costs because small businesses can locate in these key locations on a more flexible and cost-effective basis.

SmartLabs, based in Cambridge Massachusetts, touts its flexible lease terms and "on-demand, pharma-grade research environment", while other spaces offer even greater flexibility, with shared lab use and month-bymonth leases.

"Yet for some sectors, notably life sciences, the space isn't being delivered by the co-working operators due to cost of delivery. We see a need for the public sector to continue to help gap-fund this type of real estate."

John Sommerville, Managing Partner, Creative Places

In some cases, property owners are responding to demand with new construction. But industry experts in the UK emphasise the financial obstacles. Landlords cite concerns about the viability of shorter leasing agreements and uncertainty about start-ups' ability to pay.

If returns for landlords on multioccupancy, flexible lab buildings have not been enough to encourage their construction – particularly when it comes to more expensive wet-lab facilities^{vii} – help will have to come from outside the science world, such as the UK Government.



Did you know? The current public sector R&D investment target is 2.4% of UK GDP by 2027. In 2017 (the latest measurement), it represented 1.7% of UK GDP.^{viii}

BALANCING THE ECOSYSTEM

45.5% of life sciences companies base their location decisions on access to a research ecosystem.

Proximity of private enterprise to research and development facilities can also support commercial success for clusters.

"In these clusters you find a world-class university at the centre, and then the technology transfer offices, plus the lawyers who understand how to deal with the different share classes and share options," says Hermann Hauser, Co-Founder of Amadeus Capital Partners. "You get the accountants who are confident with running accounts that often have very little revenue, but have R&D tax credits, which are often very important for early-stage companies." Professional services form another vital part of the ecosystem, supporting mergers and acquisitions and initial public offerings.

The design community, meanwhile, plays an important role by developing physical spaces that foster professional collaboration and community. This relationship-building is perhaps the greatest asset of urban science clusters, facilitating encounters that spark exchange of knowledge and innovation.

2019 Global Cities Index leaders by dimension

Source: 2019 Global Cities Index Results



BUSINESS ACTIVITY

HUMAN CAPITAL

INFORMATION EXCHANGE **Paris**

CULTURAL EXPERIENCE

POLITICAL ENGAGEMENT Brussels



2019 Global Cities Outlook rankings.

Source: A.T. Kearney 2019 Global Cities report







Innovation



Governance



"The 2019 Global Cities Outlook results offer a powerful message to leading and emerging cities alike: don't get too comfortable. The leading cities cannot take anything for granted, as challenger cities are redoubling their efforts to improve. The next generation of global hubs is already fighting for talent, innovation, and direct investment—and if top-tier cities lose their momentum, these growing cities are more than ready to take their place."

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The space for change. A fluid future.

- Clusters need to break down silos to facilitate knowledge exchange and human connectivity
- Flexible spaces and multi-user facilities are vital
- Cooperation between clusters can help to lower R&D costs

FOCUSED ON BALANCE

"Successful clusters tend to have a focus," says Anaïs Le Corvec, Network Manager at the Council of European Bioregions. "For example, on medical technologies or digital health.

"The idea is to find key places in every country and to make them accessible for everyone. I don't think it is necessary that every cluster invests in every technology. Instead, they should link to facilities in other clusters that have the technology and see how it can be used. Everything under the same roof doesn't work - it's too expensive."

Balanced clusters, home to both established companies and market entrants, enable smaller players to bring fresh ideas and creativity and bigger firms to provide long-term financing and stability.



THE POWER OF PROXIMITY

The clusters in the UK's Golden Triangle are an example of this balance, and they benefit from their proximity to each other.

"There are pockets of excellent research throughout the UK. But I have found collaboration for interdisciplinary research easier by being in a region with a strength across many disciplines. In my view, proximity aids collaboration."

Dame Ann Dowling



Average lab space (sq ft) per scientist

Source: JLL Global Benchmarking research Key: Class = US building grade



Proximity, if executed well, promotes the breaking down of silos, which is another important way to enhance the commercial viability of a cluster. "People operate in their silos and they often don't really know how to work with people outside of them," says MedCity's Sarah Haywood.

"We think that clustering needs to take place around big, capable, and expert institutions," she says. "Those can either be industry based or academic based. The most successful clusters in city environments create the right spaces and mechanisms to allow people to interact effectively, engage with each other, and meet each other."

A NEW LAB LANDSCAPE

Clusters in which different disciplines collaborate and integrate diverse forms of expertise will require a mixture of spaces.

"We are moving from individual laboratories and models of selfsufficiency to higher levels of collaboration with shared laboratories and services," says Team and Technology Ltd's Michael Schuitevoerder.

"We now increasingly plan for shared labs, shared space, shared equipment, and shared support services."

Michael Schuitevoerder

Schuitevoerder cites another London lab that broke new ground when it opened, but he also warns against standing still. "London's Francis Crick Institute is still the current UK gold standard," he says. "However, when designing new labs, it is important to look back but also to look forward and improve. Labs of tomorrow need to be highly adaptable to rapidly changing trends in scientific discovery." The pace of change is so rapid that it is difficult to anticipate what the lab of the future will look like, but as science develops and becomes more interdisciplinary, spaces that aid collaboration and can adjust to different needs will become increasingly widespread.



Conti... nuinc the con.. versa... tion.

What's your take?

CITY SPACE

Urban science clusters such as Silicon Valley, Boston, and the Golden Triangle have seen enormous success in building and attracting innovation, deriving their energy and dynamism from a combination of established and smaller players. But while big firms can afford to pay high costs for real estate, start-ups and entrepreneurs struggle.

"Public sector bodies including planning authorities are recognising that you need to allocate space in districts."

John Sommerville, Creative Spaces

"There is some work being done to drive density of development to create sort of vertical science parks, if you like, in some of these city locations. A good example is White City, where Imperial College and Mitsui/Stanhope are each creating multilevel facilities that can accommodate innovative businesses."

> If property costs in cities continue to rise, what can stakeholders do to keep lab space sufficiently flexible and affordable to meet the needs of startups and companies with special requirements?

Life sciences employment in the UK

Source: Strength and opportunities report 2016, gov.uk

- Life sciences
- Pharmaceuticals
- Medical technology

People employed





SCIENCE ALLIANCES

As science continues to advance, lab design may require new feats of engineering. Design teams may benefit from closer relationships with scientists in order to answer increasingly sophisticated technical demands. Buildings will have to be flexible enough to accommodate changing space allocations and technical improvements that have yet to occur.^{ix} Other developments, such as PropTech, will alter the fabric of buildings themselves by inserting technology into the relationship between spaces and their occupants.

Given the speed of scientific change, what new relationships will be formed not just between design teams, landlords, universities and businesses, but with the scientific community itself?

2019 world competitiveness ranking

Source: World Economic Forum

| Rank | Economy | Score | Diff. from 2018 | |
|------|----------------|-------|-----------------|-------|
| | | | Rank | Score |
| 1 | SINGAPORE | 84.8 | +1 | +1.3 |
| 2 | UNITED STATES | 83.7 | -1 | -2.0 |
| 3 | HONG KONG SAR | 83.1 | +4 | +0.9 |
| 4 | NETHERLANDS | 82.4 | +2 | - |
| 5 | SWITZERLAND | 82.3 | -1 | -0.3 |
| 6 | JAPAN | 82.3 | -1 | -0.2 |
| 7 | GERMANY | 81.8 | -4 | -1.0 |
| 8 | SWEDEN | 81.2 | +1 | -0.4 |
| 9 | UNITED KINGDOM | 81.2 | -1 | -0.8 |
| 10 | DENMARK | 81.2 | _ | +0.6 |

National competitiveness is defined as the set of institutions, policies and factors that determine the level of productivity. The UK comes eighth for innovation, with its strongest indicator being scientific publications, for which it scores 1,289, 150 points higher than the most innovative country, Germany.

GOVERNMENT BACKING

Time, say the experts interviewed for this report, is a key ingredient in the formation of successful clusters. Yet in China and the United Arab Emirates, for instance, the usual timeframes (of multiple generations) are contracting, allowing urban clusters — or even a series of clusters — to emerge within a single generation.

This is due to interventionist state action and different socio-cultural contexts. But can UK science rival such intense production and development? Through its industrial policy, the UK government has promised billions of pounds of public and private investment to science.[×] But is this enough? Poor transport within and between cities in the UK, for example, is a recognised barrier to cluster growth. Although certain aspects of the Chinese approach are undesirable, others have potential lessons for the UK's policymakers. What can the government do to ensure the UK stays competitive and productive, and develop the physical infrastructure needed for successful urban science clusters?





Reaching across the silos. **Spark or Stifle:** the event.

1 Ham Yard. London

- **3** December, 2019
- 87 handpicked attendees: representing institutions, developers, architects, engineers, and investors



Summing up the sector...

"World-leading, rockstar people. We just need to make more noise to get a lot bigger, faster." **Angus Horner**

"The scientific base here is second to none, we just need better access to capital." **Freddie Dear**

"I'm hugely optimistic about it!"

Sarah Havwood

"If we bring solutions together, we can go exponential very quickly." Matt Jones











Angus is Director & Shareholder of Harwell Campus, a leading science, innovation, technology and business campus. In 2013, he founded what is now the 50% private sector shareholding in the Harwell Campus Partnership, to help HM Government accelerate growth. He sits on Harwell's Cluster Steering Board and on the HealthTec, Space and EnergyTec Boards.

Freddie is a Partner of Syncona Investment, a leading healthcare company focused on founding, building and funding global leaders in life science. Prior to this, he was a member of the Investment Team at the Wellcome Trust, which is responsible for the management of its £23 billion global investment portfolio.

MATT JONES. HOARE LEA

Matt is a Partner of Hoare Lea and has played a principal role in the strategic development of the firm's work in the science & research sector, acting as managing partner on a host of key projects in Oxford, Cambridge and London. He was one of the co-founders of both Hoare Lea's Oxford and Cambridge offices, and is currently leading on further expansion for the firm.

PANEL HOST IAN DURBIN, HOARE LEA

Ian is a Partner of Hoare Lea, with 35 years of experience in design and problem solving, and is a key member of the firm's Executive Board. He has spent his career in the science & research and higher education sectors, and was the firm's first sector lead for science & research. He is a Visiting Professor of Environmental Design and Engineering at University College London (UCL).

OUR PANELLISTS: ANGUS HORNER, HARWELL CAMPUS

FREDDIE DEAR, SYNCONA INVESTMENT

SARAH HAYWOOD. MEDCITY

Sarah led MedCity for its first five years as CEO (and now as Executive Director), helping position the greater south east of England as a world-leading, interconnected region for life sciences R&D, manufacturing and commercialisation. She previously worked as an NHS manager, Head of Operations for a neuroscience discovery unit, and led the DTI Bioscience Unit.

QUESTIONS

- What elements are essential for the creation of a science cluster? Host: Ian Durbin, Hoare Lea
- 2. A big open-plan stairwell and a free icecream van are actually two of the most useful networking tools – how else might we facilitate this cross-fertilisation of ideas that helps clusters be more successful? Glenn Crocker, Jones Lang LaSalle
- 3. If everyone is sharing digital platforms, could that be a cluster in itself? Rob Burborough, 3PM
- 4. What are the greatest challenges to creating clusters? Ian Durbin, Hoare Lea
- 5. There are so many science companies looking for space in and around London. It should be far more successful...so what's holding it back? Tom Mellows, Savills
- What lessons can be learnt from overseas science clusters? Nicola Rutt. Hawkins\Brown
- 7. Do science clusters need to consider the impact on communities and society? Rob Wolfe, CHY Consulting
- 8. What do you think the UK is losing because of our lack of pace? Charles Walford, Stanhope
- 9. Unless you have big companies prepared to back large flexible buildings for the smaller start-ups that haven't got the maturity or time to do it themselves, will the UK always be behind the curve? Peter Wilder, Oxford Science Innovations
- 10. How can we create highly-adaptable small central spaces so teams can quickly use them as a base for early stage research? Matt Bigam, GSK
- 11. How might clusters be affected by the changing UK demographics? Donna Fitzpatrick, ETL
- 12. Could the sector take advantage of the Northern Powerhouse initiative? Donna Fitzpatrick, ETL
- 13. Should London be realistically considered as a current/future destination for science investment or would the better model be for key regional hubs? Mark Halstead, ETL
- 14. There's a new trend towards merging arts and humanities and social sciences disciplines with the more traditional wet sciences. How might this affect cluster diversity and connecting different communities of people? Louisa Bowles, Hawkins\Brown

RESPONSES

- A. Freddie It's about having the innovation and then the capital to attract talent and create the infrastructure needed. The UK has all of these pieces but not necessarily the network to bring that together.
- B. Angus Success lies in the triple helix: bringing together labs, universities, and industry.
- C. Sarah In Boston, the state government invested massively, so these things have to be designed purposely. Success is down to not just buildings but soft infrastructure: things that cause people to meet and interact.
- D. Angus There's certainly a cultural aspect. We can't expect scientists to be predisposed to do networking when they're focused on a project, so we need to help people get better at it.
- E. Angus In the UK we struggle to not just create but recognise our heritage of world firsts. That's a hook you can sell. We need to steward and curate what we have already.
- F. Matt The challenges of city space requires a different approach, one that focuses on flexibility, leveraging as much value as possible from challenging sites. There's an argument for rethinking how contracts/ briefs are formed to acknowledge this.

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Night sky: 3 December 2019

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- G. Freddie When you look at Boston, one of biggest life science clusters, you have MIT and Harvard next to these businesses and investors. Finding the space to co-exist in cities is quite difficult.
- H. Sarah I was part of 'demand study' that asked large companies about their real estate needs; it was very difficult to get them to disclose information. Lots of big pharma companies know exactly where they want to be in the city, but space just isn't available.
- I. Matt When you look outside of the sector, to retail or commercial, there's a variety of ways they leverage value. They provide learnings that developers could draw on to boost clusters' success.
- J. Freddie There's a slight catch 22 in that these buildings are expensive to build and early-stage companies who need them evolve fast.
- K. Sarah Singapore has managed to create a strong science cluster from scratch because they threw a lot of money at it, benefiting from good universities. China has invested enormously in creating physical spaces, but I think the jury's still out on whether that's worked, because they need to offer more than just investment and a building.
- L. Angus China, for example, gets stuff built at pace. In the UK we're not good at this.
- M. Angus If you have an ownership/asset management model rather than simply wanting a building to quickly let and flog on for a nice yield, then you're more prepared to put major capital down to build the bigger more flexible spaces and have high levels of churn.
- N. Freddie The issue comes from the fact that start-up companies that go out looking for space can sometimes evolve so fast they need more space in three months. We need a new type of model for real estate to respond to this.
- O. Matt Ultimately, the whole sector wants change for the better, so therefore how we approach everything has to change – from finance to design.

- P. Sarah The question is 'what kind of growth do we want to see and how do we make that work (for whatever level of geography you want to look at)?'. Up until now, Government's agenda to drive economic development is all about growth, but that has to be growth that works for everyone. The industries we're talking about are high value jobs but not open to everyone in communities, so we need to think about how the whole supply chain for it can help local communities to not get left behind. Inviting people outside of the sector in to these spaces is really important too.
- Q. Angus So much is lost in translation. Developers want companies to decide and stick with what building they need, but companies don't understand why they can't just get a building when they need one. We need to explain both sides better.
- R. Ian I wonder if what's missing in this ecosystem is the single collective voice (like the British Council for Offices in workplace) that speaks for all: developer, scientist, designers etc. There's a real need for a body that has conversations with Government and policy makers.
- S. Sarah I'd like to see the UK itself working as a cluster, or at least an interplaying set of geographical clusters to maximise economic return by generating ideas and human capital.
- T. Matt There's a constant narrative of 'if the space was available, we could fill it'. The ROI is there, it just needs to be grasped in the right way.



What we've been thinking about since...

What can science clusters learn from successful placemaking in other sectors? One of our clients Argent, for example, chose to develop Granary Square at King's Cross. Its forward-looking people saw a wider opportunity to drive value into what was a rundown area. Placemaking attracts people and, in turn, allows for the highest yield when it comes to rent. In fact, our own London office is located in one of the first areas Argent regenerated at King's Cross. The building we're tenants in hasn't changed, but its value has because of the placemaking. So how did it come together? Quite simple really, Argent secured an 'anchor' (UCLA) to set the tone for the demographic they wanted to attract (influential, young and creative cross-discipline thinkers)... and then the other tenants followed. Could placemaking ever be this simple for S&R? Can we be more flexible in how we fund these types of buildings?

We're increasingly conscious that the developer community has no in-depth understanding of the size and nature of the demand for space from the S&R community. This is a real issue that we're aiming to play a part in tackling: to create common understanding between both sides of the supply/demand equation.

We think there's the need for an industry body that speaks for all parties... perhaps the Science & Research equivalent of the British Council for Offices for instance?

Conversation Constellation

Linking the nonlinear: knowledge, debate, and discussion.



There are also some major global trends at play here...

A push in education towards STEAM (merging arts with STEM subjects) is likely to mean future scientists and researchers could naturally be more generalist. Will we have a generation of students who know how to work in a cross-collaborative manner and demand/ drive the success of clusters? We're already seeing this trend towards cross-discipline learning in the engineering industry, with a new MEng in Engineering and Architectural Design being launched at UCL. As a liaison partner, we're helping to shape the course content to equip students with a cross-discipline skillset and overcome fragmentation in the construction industry.

There are also more pressing questions: if quantum computing is cracked, allowing researchers to use quantum computers to model complicated chemical reactions or simulate molecules, how much lab space will be needed in the future? If the rise of Al drives a more knowledge-based economy, will clusters have to demonstrate the productivity or brain-friendliness of a building? In the race for global talent, how can the UK define and differentiate itself from competitors?

...We're using all of these questions, and more, as a springboard to further debate, discussion – and action. Never has the UK's scientific community needed to think so holistically. Join us!

Let's discuss.



IAN DURBIN iandurbin@hoarelea.com



MATT JONES matthewjones@hoarelea.com



Notes. What are your thoughts?

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REPORT CONTRIBUTORS

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Hermann Hauser, Co-Founder, Amadeus Capital Partners

Sarah Haywood, Executive Director, MedCity

Michael Schuitevoerder, Director, Team and Technology Ltd

John Sommerville, Managing Partner, Creative Places

EVENT ATTENDEES

3PM Abell Nepp Achilles Therapeutics AEW AKT II BioMed Realty Cambridge Enterprise CHY Consultancy Currie & Brown Derwent

ETL

Feilden+Mawson First Base Gardiner & Theobald Gensler Gleeds Grimshaw GSK Harwell Hassell Hawkins\Brown Imperial College London Imperial Thinkspace ISG Jestico + Whiles JLL JTP Architects Kier Laing O'Rourke Legal & General Real Assets Longitude Lothbury Investment Management Mace Marick Real Estate MedCity Mitsui Fudosan Moorfields Eye Hospital Norges Investment Bank Oxford Sciences Innovation Perkins&Will RLB Savills Sheppard Robson Stanhope Stantec Syncona Investment Management Turner & Townsend UCB Wates WilkinsonEyre Wellcome Trust

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