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SOCIAL SCIENCE PARKS

SOCIETY'S NEW SUPER-LABS

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About the Authors

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CONTENTS

FOREWORD

This paper introduces a practical innovation in facilitating interdisciplinary social science research and its application: the social science research park (SPARK). Over the past decade, there has been increasing interest in developing interdisciplinary research that addresses societal problems and so-called 'grand challenges'. But the evidence of successfully delivering such interdisciplinarity is weak, particularly when it comes to social science-led research. With this challenge in mind, this essay explores the potential of SPARKs: purpose-built facilities housing applied social science research groups alongside researchers from other disciplines, external research stakeholders and collaborators from the private, public and third sectors. The intention is to create the facilities and physical spaces that encourage creative interaction and promote the adoption of collaborative approaches to research. These in turn provide new insights into practical problems and policy issues and the foundation for discovery leading to economic, public and social innovation.

INTRODUCTION

The world is confronted by an array of deep-seated, complex and seemingly intractable problems. The social world lies at the heart of these challenges and social science must be central to how we understand them and to how we develop new, effective and sustainable solutions. Bringing our collective intelligence to bear in new ways to devise new solutions is imperative if we are to address these challenges in the 21st century. In this paper we propose a radical institutional innovation to help us achieve this goal: social science research parks (SPARKs) - purpose-built facilities housing applied research groups from across the social sciences alongside researchers from other disciplines, external research stakeholders and collaborators from the private, public and third sectors.

The generic concept of a dedicated piece of university real estate where basic research is turned into practical applications, usually in the form of new technology for spin-out companies, is a familiar one. A social science park translates this concept into the 'social science' context. This is an attempt to create a dedicated space for the generation of new ideas that are founded on those areas of human knowledge that focus on society and the way it is organised: geography, economics, law, management and organisation studies, sociology, political science, social psychology, etc. The social science park is an experiment *in* social science as well as *of* social science. It is intended to be a catalyst both for the more innovation-oriented social science and for the more socially-oriented system of innovation that is required by the problems of our times.

On a global scale, society faces multiple grand challenges requiring new forms of combinatorial creativity that fuse understanding and experience. Creating new spaces, new organisational forms, and new tools for the practical application of knowledge, is a societal imperative. Though SPARK is a physical place centred on a building or set of buildings, it is its soft infrastructure – its culture and its sense of common endeavour, its associative capacity and network capital – that will be the biggest factor in determining its success. This is why networks, the identification of potential partners and the development of strong relationships, have featured so prominently in recent discussion of the sources of 'discontinuous innovation' (Birkinshaw, Bessant and Delbridge, 2007).

Science has long dominated our concept of innovation. But technological innovation has always had its social analogue. Over a century ago sociologists at the University of Chicago were referring to social technology, social invention and, somewhat more problematically perhaps, to social engineering. Writing in the 1960s, Peter Drucker and Michael Young popularised the term 'social innovation' which has now become a mainstream term for practitioners worldwide. It is this same logic that lies behind the proposal for a social science park (Lundstrom and Zhou, 2011). For Stuart Conger (1974), the pioneering Canadian social innovator, one of the greatest obstacles to social progress was social scientists' wariness of getting involved in the process of invention. For much of the 20th century, certainly, social scientists have seen themselves more in the role of critic than inventor. The social scientist *"was not interested in making the world a better place"* as President Hoover's chief statistician William Ogburn claimed emphatically in an influential address to the American Sociological Society. *"Science is interested directly in one thing only.....discovering new knowledge"* (Ogburn, 1930).

SPARKs are a conscious attempt to promote a newly agentic social science – imaginative and experimental – with researchers moving from a position of passive observation of society to active involvement in its transformation. The work of Michael Burawoy (2004) in outlining the importance of public sociology and John Brewer's (2013) recent advocacy of the new public value of social science both make exactly this case (see also Delbridge, 2014). But mobilising the sociological imagination of social scientists to produce this new vision of public value will require a number of features to be delivered, inter alia, a problem-focused and applied approach, collaboration with actors across all levels and sectors of society, and an inter- or post-disciplinary perspective on the creation of new social scientific knowledge (Brewer, 2013). SPARKs are a vehicle for delivering this vision. In common with science parks, technopoles, science cities and other physical knowledge communities, they consist of three inter-locking elements (Korotka, Benneworth and Ratinho, 2015):

- Infrastructure for co-location in which a range of actors (researchers, research users and co-researchers in the public, private and third sectors) can come together to undertake shared activities.
- The mobilisation of a knowledge community, or community of research-and-practice, within and beyond the confines of the park through informal networks and more formal activity.
- The development of an entrepreneurial ecosystem (spin-outs, prototypes, etc.) as co-located interacting actors identify opportunities for innovation.

In this paper, we will briefly review the relevant evidence and existing knowledge on the central issues of creativity, interdisciplinarity and the spatial, political and cultural aspects of innovation. We will then map out how these might inform the design and development of a social science research park, and review the current developments that suggest SPARK is an idea for which the time has come.

SPACE MATTERS: THE PHYSICAL SPACES OF INNOVATION

Throughout history people have created new spaces for the production of knowledge. This is because, in general, the creation of human knowledge, notwithstanding the Eureka moments of extraordinary individuals, is fundamentally a social process - an exchange of ideas which needs a forum, a context, a place in which to work, from the libraries and academies of classical antiquity and the monasteries of the Middle Ages, to the universities and innovation labs of today (Allen and Henn, 2011; Hargadon, 2003).

Early places of learning were developed primarily to provide a setting for the transfer and codification of knowledge. Their basic infrastructure, the pattern of cloisters and cells, dormitories and dining areas, has not changed much in a thousand years. Some argue that the digital age threatens to shatter this template. The promise of a truly global academy, with its universal and instantaneous access to the world's best teachers, together with the entire canon of accumulated knowledge, is seen by some as a threat to the continued survival of all but the leading centres of knowledge (Tapscott, 2009). But much more likely than some modern equivalent of the dissolution of the monasteries is a reinvented role for universities as sites for problem-solving and innovation. Under the current science policy discourse, the ivory tower is being replaced by the agora of the new academy – engaged and relevant, dynamic and entrepreneurial. The goal of the universities' Third Mission – alongside their traditional focus on teaching and fundamental research – is to make a positive contribution to society, an ethos mirrored in a more economic context in the Triple Helix of university-industry-government collaboration (Leydesdorff and Etzkowitz, 1998). This practical, pragmatic view of the university's role and its relationship to society has been echoed in other ideas: the concept of Mode 2 (Gibbons et al., 2004) and Science II (Hollingsworth and Müller, 2008), the Entrepreneurial University (Etzkowitz, 2004), national and regional innovation systems (Lundvall, 1992; Cooke and Morgan, 1994) and the civic university (Goddard, 2009). This ethic of social accountability is also enshrined in the UK Research Excellence Framework's emphasis on the demonstration of social and economic impact, and in the European Union Horizon 2020 programme's narrative of grand challenges.

This shifting paradigm might be expected to herald a parallel transition in the organisational and physical architecture of our universities. Innovation requires the production and communication of tacit knowledge, an interchange between two or more people involving dialogue and debate, challenge and co-operation. This works best when people are in the same physical space, working on a shared problem, and have formed a sense of trust and shared enterprise or 'communal exchange' (Biggart and Delbridge, 2004). They need to have developed a common language and some common understanding of the issue. Though they may bring to it their own special insights and expertise, they need to be able to communicate. Trust, shared values and cognitive proximity are key to promoting the communal exchange of complex ideas and knowledge, and physical proximity can play an important role in promoting these. Research has shown the benefits of the 'enabling space' to engage in what has been described in the literature on economic clusters and city-regions as 'social learning' (Peschl and Fundneider, 2012). It is the kind of learning where direct communication is essential. Innovation, in John Kao's (2002) words, needs a home.

This explains why the death of distance has been somewhat exaggerated and why 'place' has become an important element in industrial policy (Morgan, 2004). It also explains the creation of science parks as dedicated spaces for innovation attached to universities.

Learning from science parks

Science parks emerged in the 1950s in the US, at Stanford University in California and the Research Triangle of North Carolina, as industrial parks for academic entrepreneurship based on the commercialisation of their scientific knowledge. The take-up of the idea was initially quite limited; Cambridge Science Park, founded in 1970, is the oldest in the UK but was initially slow to develop. By the 1980s, however, science and technology parks began to proliferate and there are now well over 100 in the UK alone. These innovation spaces vary considerably in form, in scale and in the way they are managed. They range from the vast technopole and science city projects that began in France and Japan in the 1960s and 70s, to smaller-scale incubators and accelerators like the St John's Innovation Centre in Cambridge, to trans-disciplinary studios like the MIT Media-Lab, and lastly to the more conventional science, technology or research park.

The empirical evidence base for science parks' effectiveness as a policy intervention is sparse, mixed and contradictory, though much of the research tends to suggest some degree of positive association with at least one of the indicators chosen. A series of studies in the 1990s led by Paul Westhead showed that firms on science parks in the UK had a greater survival rate than comparable firms located off-park, though there did not appear to be any other statistically significant benefits (Westhead and Cowling, 1995; Westhead and Storey, 1997). A later study in 2003 of UK science parks did demonstrate their greater relative research productivity (Siegel, Westhead and Wright, 2003). International studies have also shown evidence of greater patenting activity in technology-based firms based on science parks (Squicciarini, 2008); greater patenting productivity (Yang, Motohashi and Chen, 2009); better research linkages with universities (Fukugawa, 2006); greater relative employment growth based on presence in the park (Löfsten and Lindelöf, 2002) and proximity of the park to a university (Link and Scott, 2006); greater survival rates (Ferguson and Olofsson, 2004); and a higher likelihood of attracting industrial research labs based on the location of a science park locally (Appold, 2004). However, it is equally clear that not all science parks are successful and that there are likely limits to what can be achieved simply through the construction of physical spaces. The failure of the Technium programme in Wales is a recent example (Morgan, 2013).

There is certainly a 'cargo cult' flavour to 'science park' evangelism: build the field of dreams, add a tech transfer office and an investment fund, and the spin-outs will be out-spun. But the claim that the entire 'science park economy' is essentially a myth, as Paul Nightingale and Alex Coad of SPRU have suggested, is perhaps difficult to sustain in the face of some more celebrated successes (Nightingale and Coad, 2014). The Cambridge Technology Cluster has produced 14 $1 billion plus companies in the last 15 years, two of which have achieved valuations in excess of $10 billion. Internationally, the development of the Matam High Tech Park, Israel's first dedicated technology park, by the Haifa Economic Corporation in 1974 - with its successful wooing of Intel and IBM, and strong links with Haifa Technion University - was undoubtedly a key element in Israel's later technology success. Further afield, Beijing's Zhongguancun Science Park - with its strong association with both Beijing and Tsinghua Universities, together with the Chinese Academy of Sciences - certainly helped develop China's fledgling technology sector, seeding the eventual success of the likes of Lenovo and Baidu. Similar cases could be made for Taiwan's Hsinchu Science Park, France's Sophia Antipolis or Sweden's Kista Science City.

If we widen our definition of science parks to the university-led urban technopole, then the negative narrative becomes even harder to sustain. MIT's decision in 1961 to create Tech Square, bringing together tenants engaged in computer science e.g. IBM and Polaroid, under the same roof as MIT researchers laid the foundations for a global technology hub. Though Castells and Hall concentrated in their classic work, *Technopoles of the World* (Castells and Hall, 1994), on garden-or-campus style suburban settings they did begin to recognise the special role played by cities as 'milieux of innovation', and this has been reiterated by more recent work by Richard Florida (2002) and Ed Glaeser (2011). Echoing the earlier work of Jane Jacobs (1961), the prevailing view is that cities can draw upon certain essential features - density, diversity, the mixture of old and new - which make them the perfect place for innovation and creativity.

In an era of open innovation, with its need for diverse networks of problem-solvers, and a creative class that craves the 'psychogeography' of the city, it should come as no surprise to find that innovation labs, both public and private, are, in the words of the Brookings Institution's Bruce Katz and Julie Wagner, heading downtown (2014). For the new 'social knowledge economy', people and their social interactions are the catalysts of innovation. In the case of social science parks, the very subject of research, the traditional environment of remote, fragmented, depopulated locations, with uninspiring buildings and soul-less spaces, is far less conducive than the new, urban 'innovation district': a science park at city-scale.

Two of the three models for these neo-technopoles are university-led: the so-called 'Eds-and-Meds', anchor-plus districts based around research-intensive universities and university hospitals, e.g. Kendall Square and MIT. Secondly, the urbanised science park, located in a sprawling suburban setting, but now seeking to develop some of the features of a more urban environment, e.g. the Research Triangle Park's new plan for developing high-density housing, restaurants, amenities and startup incubators close to its traditional research establishments. Similar efforts are being made by the Swiss Federal Institute of Technology to turn its satellite science campus at Hönggerberg, seven miles from the centre of Zurich, into a socially vibrant 'science city'.

As traditional science parks urbanise, a parallel phenomenon is emerging of universities transforming cities into vast open lab-space through new urban, university-affiliated innovation campuses, e.g. London's Imperial West, the new multi-billion collaboration between Cornell and Technion University at Roosevelt Island in New York, or Toronto's Discovery District. More innovative still are attempts to leverage the potential, not just of the city-as-location, but the city-as-lab. The University of North Carolina's urban-based Centennial Campus in Raleigh, 15 miles from the Research Triangle Park, is a self-contained 'city' - a perfect test-bed for everything from smart grids to transport and the latest in digital health monitors. Similarly, in San Diego's downtown East Village, as part of the 93-acre IDEA District based around innovation, design, education and the arts, UCSD is proposing to create a 'collaboration laboratory' where students and faculty can research and prototype solutions to contemporary urban problems.

Planning the Research Triangle Park in the 1950's.

Cambridge Science Park.

ETH Hoengerberg Science City under construction.

Toronto's Discovery District.

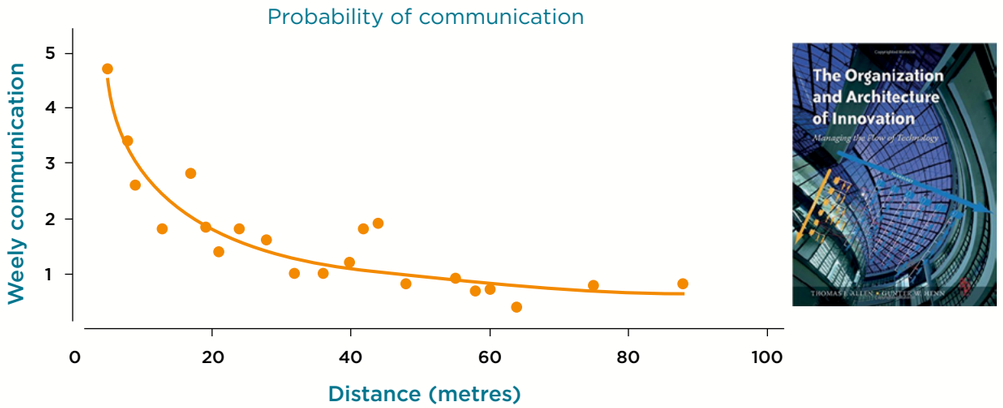
ORCHESTRATING CO-CREATION AND THE QUADRUPLE HELIX

New concepts of how knowledge is produced are challenging even the relatively recent paradigms of the Third Mission and the Triple Helix, and the social science park as an idea will need to reflect these new networked, non-linear ideas of knowledge production. The idea of the Third Mission carried within it a sense of discrete worlds of research, learning and innovation in a linear process, beginning at the workbench and ending in 'technology transfer' or commercialisation. This compartmentalised world-view was reflected in the physical location of science parks in off-campus, often pretty isolated and impersonal locations.

The concept of the Knowledge Triangle (Lappalainen and Markkula, 2013) stresses the many synergies between the three missions that bind them together. The Triple Helix, in a similar vein, has also now become the Quadruple Helix, as the fourth pillar of society – individuals and groups of end-users and citizens – is incorporated in a spirit of open innovation. Now knowledge is recognised to be more widely distributed, gathering and generating new knowledge requires us to deepen collaboration with a wider range of actors: firms, academics, public agencies, regions and cities, people and citizens. A social science park therefore needs to be a platform for interaction, a space for collaboration and knowledge co-creation by researchers, students, citizens, customers and stakeholders. Where traditional science parks have often felt like corporate gated communities, a social science park has to be social and sociable: a public square of open interaction at the heart of social life, an innovation hub in a wider system.

At the centre of SPARK as a concept is the idea of co-creation: people working together across disciplines and across professional boundaries to study, learn about and solve some of the most pressing problems we face today. The first necessary condition for successful collaboration is physical proximity. Thomas J. Allen's (1977) famous discovery at MIT in the 1970s, the so-called Allen curve, demonstrated an exponential relationship between distance and the regularity of communication between engineers: someone six feet away from you was four times more likely to talk to you regularly than someone 60 feet away, someone on a different floor was unlikely to speak to you, and someone in a separate building you probably never met at all. Proximity influences not just the quantity, but also the quality of interactions. Harvard Medical School's Isaac Kohane and his collaborators' work examining the effect of distance between the authors of 35,000 academic papers, showed much greater impact, as measured by the frequency of citation, the closer the authors were based (Kyungjoon et al., 2010). Physical proximity creates a greater likelihood of non-regimented conversations outside the parameters of organised meetings, which are more likely to generate random, creative connections (Catalini, 2012). Co-location means it is easier to establish contact and exchange knowledge. Casual conversations, overhearing others, exposure to the buzz and atmosphere of a place creates a constant flow of knowledge spillovers.

Figure 1: **The Allen Curve**



Source: Allen and Henn (2011)

There are other forms of proximity which are equally important, however. Common values, attitudes, emotional disposition and a shared commitment are important too (Boschma, 2005). Ensuring that these other proximities – cognitive, social, institutional and organisational – are in place will be critical to ensure the SPARK does not simply become an empty shell or a space inhabited by isolated actors. This needs to be done with a deft touch. Sharing some degree of common interests or a common language is critical to success, but too much similarity can also be counter-productive. Hybridity and serendipity are crucial to the innovation process; the park must be a place where different skills and knowledge bases mingle in a common home, striking a balance of proximity with heterogeneity. Too much cognitive distance – say between practitioners and researchers – means people will not be able to understand each other, but too little means they will have nothing new to say to each other and no new ideas will flow. By the same token, as most relevant knowledge is contained outside the confines of the SPARK, sophisticated ways of co-ordinating with the wider world will need to be constructed. Promising recent developments in the regional ecosystem of collective entrepreneurship that has been nurtured in the Basque Region, are suggestive of both what is required and what is possible (Morgan, 2015).

Recent research in the UK (Helmer, 2011) suggests that knowledge spill-overs – for which there is strong evidence of benefit in the context of economic clusters – are more likely to happen between firms within the same sector rather than across sectors, i.e. innovation is more likely to happen in Steven Johnson's (2010) 'adjacent possible'. An explanation for this can be found in Harry Collins and Robert Evans' (2002) work on the role of interactional

expertise – the ability to have a meaningful conversation about a subject area without actually being an expert in it substantively. A software engineer may have a meaningful exchange and offer a new insight to an expert working on another aspect of IT, but may find it difficult to interact with a biochemist. Science parks, like innovation districts writ large, tend to work best when they exhibit what economic geographers have dubbed 'related variety' – a diversity of approaches built around a common core. That common ground has to be built on pre-existing foundations. Science parks cannot be conjured out of thin air, they have to relate to the resources to hand in the innovation system and the regional knowledge base. Creating a building and expecting innovation, knowledge sharing and creative collaboration to happen spontaneously, is destined to fail. This insight underscores the 'social' nature of the social science park. The curation of their composite networks, together with the organisation and facilitation of interaction, will be crucial to success, as will the proactive positioning of SPARKs within their regional innovation contexts.

The role of the universities is thus shifting from that of being the monopoly producer of knowledge to the orchestrator of regional innovation ecosystems. Orchestration is a method for co-ordinating a diverse network of actors without top-down direction – by designing spaces, creating a culture and developing incentives which seed co-operation and channel activity along broadly agreed lines. According to Markku Markkula of Aalto University (2013), this task of orchestration requires a multiplicity of new elements: new networks and alliances, new concepts and new tools, but also new physical, virtual and mental spaces. This shared environment is critical to the building of a successful innovation ecosystem and requires attention to the infrastructures, technologies, tools, and activities that are important in facilitating communication and building common understanding. This vision emphasises the importance of bringing in 'outsiders' to the university as part of the collaborative venture, and the role that social science parks might play in this endeavour.

SOCIAL SCIENTISTS AS SOCIAL INNOVATORS

As noted above, SPARKs are a conscious attempt to promote a more agentic and engaged social science with researchers moving from a position of passive observation of society to being more actively involved in its transformation. This approach builds on Burawoy's (2004) articulation of the importance of public sociology and Brewer's (2013) proposals for the new public value of social science, linking back to earlier periods when science has been strongly linked to social reform - the Enlightenment in Europe and the Progressive Era in the United States. It chimes with a wider shift towards a more action-oriented philosophy of science, the move from Mode 1 knowledge to Mode 2 referenced earlier, where Mode 1 is the curiosity-driven desire to understand the world and Mode 2 is motivated by the desire to use our knowledge to change the world for the better. There are various possibilities for how these objectives might be achieved. One approach, that promotes experimental methods and collaboration with various research stakeholders in concerted attempts to produce meaningful and practicable interventions, has seen the emergence of 'living labs'.

Living labs were first invented at MIT in 2003, but since then have begun to spread throughout the private sector (e.g. Philips Research Experience Lab) and in higher education (Hassan, 2014). They can be temporary or permanent, and can vary from small-scale immersive developmental environments, to real settings within the community, to the macro-level where a whole city can be used as a living lab. The basic principle is one of students, professors, experts, practitioners and researchers developing new professional and scientific knowledge in concert with living lab partners (companies, third sector bodies, the public sector) and end-users in an actual living environment. These are dynamic settings in which there is experimentation in the form of rapid prototyping, continuous cycles of trialling and testing and constant iteration. The approach draws upon post-war insights about group dynamics and systems thinking from the Tavistock Institute and Kurt Lewin, blended with ideas from design thinking, creative problem-solving, innovation management, and the agile movement in software development (Westley, Goebey and Robinson, 2012). 'Getting the whole system in the room' – a phrase which harks back to Kurt Lewin's British protégé and co-founder of the Tavistock Institute, Eric Trist – is acknowledged as a key part of the process. The social science park, in part, reflects the need to build a bigger room, a super-laboratory. But it is not just the size of the room that is important.

The Architecture of Innovation

MIT's MediaLab or Stanford's d.school are places, in the words of John Kao (2002), in which there are 'opportunities for new solutions to emerge as people meet, interact, experiment, ideate and prototype'. He compares these trans-disciplinary studios with the atelier of the artist – an open environment where creativity is at the centre. The physical designs of these spaces are critical to their success. Drawing on the experience of innovative work-spaces worldwide, some key themes emerge (Laure-Fayard and Weeks, 2011; Doorley and Witthoft, 2012):

- **Visibility**: workspaces and meeting places are open and transparent.
- **Collision spaces**: the design of shared facilities/resources – cafes, kitchen areas, roof terraces and community gardens, etc. – creates multiple, informal, unpredictable, serendipitous interaction, the apocryphal water-cooler moment.
- **Opt-outs**: alcoves, pods, etc. are also important to create areas for private conversation and quiet contemplation.
- **Erosion of status**: people work together and share facilities without visible symbols of rank.
- **Blurring work and play**: bright surroundings, recreational areas, comfortable furniture, and the development of a strong, work-based social life are all important in fostering creativity, cohesion and a sense of belonging.
- **Narrative**: the form of the building itself and, in the case of an existing building, its history, represent a key element in the self-concept of the organisation and the image it wishes to project.
- **Overflow**: room to grow organically nearby or empty space within the existing building will be important to retain a sense of the park being in a continuous state of evolution; and at a practical level to accommodate new centres, projects and collaborators.

While physical proximity is a necessary component, the design of the social and institutional architecture of the park is at least as important as the design of the space itself. With its emphasis on solving grand challenges rather than micro-spin outs, the spirit of SPARK is closer in some ways to the great pioneering super-labs of the of the 20th century: the semi-academic and largely defence-funded research institutes that developed in the United States in response to the Cold War (SRI, MITRE and the RAND Corporation) as well as the celebrated corporate campuses of Bell Labs and Xerox PARC. Reproducing that mixture of freedom of inquiry with a clear sense of mission that seems to characterise 'hot groups' will be one of SPARK's biggest challenges, together with finding a balance between diversity and coherence of endeavour (Leavitt and Lipman-Blumen, 1995). There will also be challenges of housing new, innovative and collaborative projects within the university context; bureaucratic systems and organisational routines will need to be revisited to ensure they are sufficiently flexible and responsive to the living lab context. There are also the perennial and increasingly well-recognised difficulties in delivering interdisciplinary research in universities that are still largely organised and incentivised on disciplinary bases.

Again, architecture may have a role in tearing down the silo. The hexagonal Behavioural Sciences Building at the University of Illinois in Chicago, based on the architect Walter Netsch's Field Theory, attempted to 'nudge' students and researchers into interaction through the design of corridors as 'chance meeting' spaces, forcing faculty to walk long distances between lecture rooms and offices. *"What happens between classes,"* according to Netsch, *"came to be regarded as being as important as what happens in classes"* (Coulson, Roberts and Taylor, 2011).

Given the increasing prominence of interdisciplinary discourses in science policy circles, it comes as no surprise that a new university architecture is emerging with an emphasis on visibility and open-ness. Stanford University's James H. Clark Centre, which houses inter-disciplinary research in the biological sciences and opened in 2003, was the pioneer of the new, shared, open-plan laboratory, which can also be seen at the heart of Will Alsopp's multi-coloured Blizard Centre housing the Institute of Cell and Medical Sciences at London's Queen Mary University. The new Crick Institute, which brings together the Medical Research Council, the Wellcome Trust, Cancer Research UK, and three leading research universities to drive forward biomedical research in the UK, is similarly planned around a light-filled atrium with visibility across all floors, together with open-plan floor-plates and glass partitions to spark curiosity and collaboration (Coulson, Roberts and Taylor, 2015).

One specific area of inter-disciplinarity where there is swift and promising development is that of Computational Social Science (CSS). CSS is an emerging academic field at the intersection of social science, computer science, mathematics and statistics which promises to revolutionise our understanding of complex social systems and provide an unprecedented opportunity to address some of the major challenges we face. Traditional social science enquiry lacked the ability to conduct massive social observation and simulation at the level of granular detail that is now possible. Three things have come together to enable this:

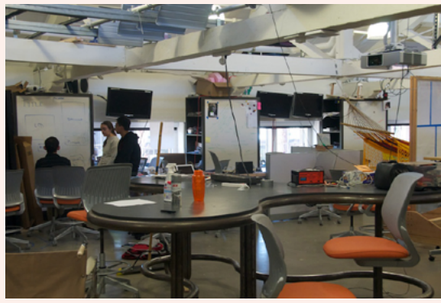
- **Hardware**: cheap processing power, supercomputers and distributed computing make execution of large-scale heterogeneous programmes feasible.
- **Large-scale data-sets**: new types of user-generated data made available through ICT applications, e.g. mobile phone records, social networks, commercial transactions, geo-located, minute-by-minute, which can be used to model the complex, interdependent dynamics of human behaviour at a societal scale.
- **New methodologies**: agent-based modelling, machine-learning, advanced data mining, decision trees, case-based reasoning engines, modern Bayesian methods, clusters and support vector machines.

This combination of Big Data, new techniques and new computational capacity means that generative explanations about how people think, interrelate, create wealth, govern themselves, and reproduce their cultures, can be developed in virtual computational social worlds, analysed and experimented with, and then tested empirically using real world data. As a number of social scientists have argued in a recent 'manifesto': *"The combination of the computational approach with a sensible use of experiment will bring social science closer to establishing a well-grounded link between theory and empirical facts and research"* (Conti et al., 2012). This has far-reaching implications for vast areas of human activity and opens up new possibilities for collaboration and interdisciplinary activity across the core social sciences and other disciplines.

Behavioural Sciences Building, University of Illinois, 1969.

Xerox Parc Computer Science Lab, 1970. ©PARC.

Blizard Building, Queen Mary's University, London, 2005.



Hasso Plattner Instutute of Design (or d.school), Stanford University, 2010.

BUILDING THE SOCIETAL TEST-BED

There is an increasingly prevalent view in policy and academic circles that studying the 'natural experiments' thrown up by society's independent evolution is insufficient when seeking to understand our underlying problems. The alternative vision is one of introducing into social policy the same rigour that the randomised field or control trial represents in medicine. The American author Jim Manzi has written about its use by business, most notably the credit card company Capital One's attempt to turn itself into a scientific laboratory for business, conducting thousands of mini-experiments every month on aspects of customer behaviour and business strategy (Manzi, 2012). The Social Science Park could be a platform for the development of a parallel test-bed environment for society as a whole.

The use of randomised control trials in a more social context dates from the 1960s. Large-scale social experiments were subjected to rigorous evaluation but the disappointing results led to a loss of interest on the part of politicians. Since the early 1980s, however, there has been something of a resurgence of experimental social science. The global figure for social RCTs conducted continues to rise year on year – though they still number only a few thousand in total. The RCT – though it is not without its detractors - is increasingly seen as a promising method for evaluating specific social interventions. MIT's Poverty Action Lab, for example, has conducted wide-ranging RCTs related to poverty reduction, education and health in developing countries; Harvard economist Ronald Fryer's Ed-Lab work on the US school system, and Chicago sociologist John A. List's work on racial discrimination are among the other most often-cited examples. The work of the Behavioural Insights Team in the UK has also shown that RCTs need not be expensive and can be run in multiple short cycles of iteration as part of existing systems of data collection and management (Halpern, 2015). The EU is also actively promoting the adoption of policy experimentation, coincidentally called the SPARK (Social Policy Analysis for Robust Knowledge) network. While the term 'experimental government' still poses some difficulty, we are possibly poised on the cusp of a new era, as Geoff Mulgan has argued, *"where governments are willing to test their ideas out – to run RCTs and embed continuous learning and feedback into everything they do."* (Mulgan 2013).

As the social sciences begin to rediscover the power of experimentation, in some ways they are beginning to converge with the natural sciences. And just as chemistry would be unthinkable without lab space – the same is increasingly true for social scientists. In the last few years more than 170 social science labs have sprung up in various guises, conducting wide-ranging experiments in diverse fields: experimental economics and finance (e.g. auction and market design, trading strategies), behavioural science (learning, social competence, inter-cultural understanding), voting behaviour, network phenomena, decision-making, game theory etc. This approach is becoming increasingly influential. Since the turn of the Millennium, two Economics Nobel Prize winners, for example, have been experimentalists.

The first tier of lab-like activity is represented by laboratory settings on site with facilities to allow volunteers, mostly university students, to participate in experiments simultaneously, usually involving the use of a network of computers in a controlled environment, e.g. the US's biggest wireless experimental lab at UC Berkeley's X-Lab in California or the 25 partitioned work-stations available for use at Nuffield College, Oxford's Centre for Experimental Social Sciences. Other ESS laboratories are more virtual, availing themselves of the power of the internet to deliver massive online experiments at scale. Others, drawing on psychology's longer history of experimental work, involve much larger facilities for face-to-face experiments, e.g. the 1,200 m^2 of specially designed observation and group interaction spaces at the world's biggest Behavioural and Social Science Lab in Bremen's Jacob University.

PUTTING RESEARCH (BACK) INTO PRACTICE

If all a social science park ends up being is a gleaming new workspace for academics, then it will have failed in its purpose. One of its primary functions must be to tear down the visible and invisible walls that separate research and practice. It is a strange feature of academic life that, as Jonathan Shepherd has pointed out, with the exception of the consultant staff of university medical schools, few academics who teach public service professionals continue to practice (Shepherd, 2014). Social science parks should be conceived as an environment for a new breed of practitioner-academics to prototype ideas based on their research findings, working with other practitioners in the field to assess the effectiveness of new approaches. This could involve active partnership with service providers, e.g. a network of experimental schools, echoing John Dewey's idea of a Laboratory School at the University of Chicago at the beginning of the 20th century which spread throughout the Unites States, and is now being partially revived in the UK with plans for University-based schools in Birmingham and Cambridge.

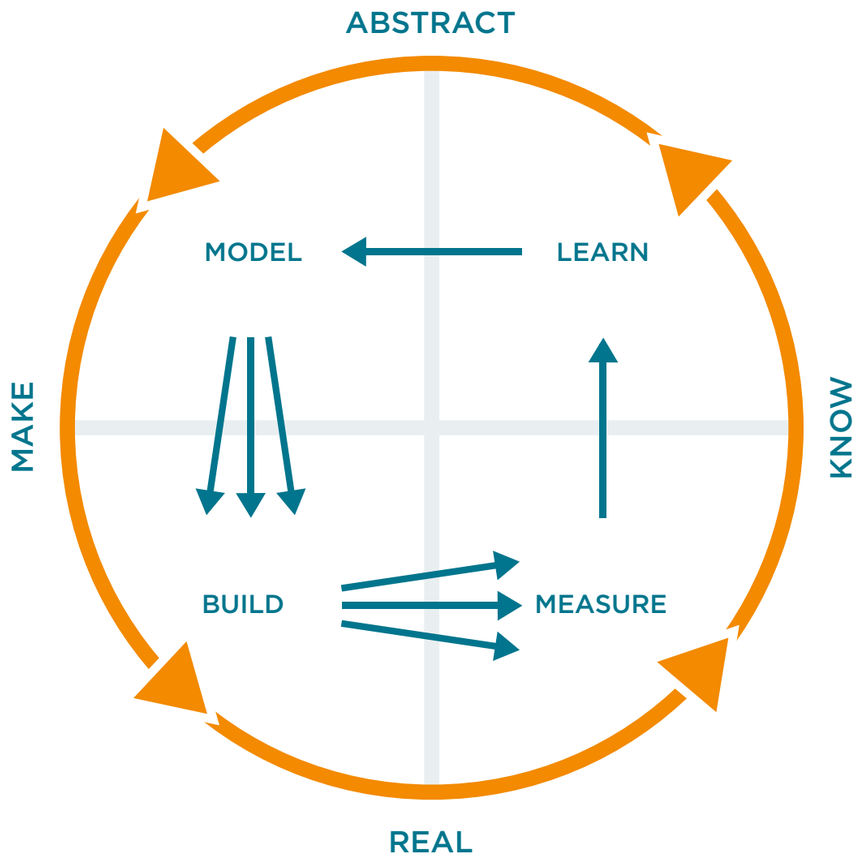
Another important element would be to support practitioners in the field in strengthening their own research capabilities. One means of doing this would be to mainstream basic research methods, particularly participatory action research, into professional education. Another would be the adoption of the Learning by Developing approach developed at Aalto University. This builds research and innovation into learning by incorporating real-world R&D projects with external partners into mainstream undergraduate and postgraduate study. In a similar vein, Tsinghua University's Open Fiesta (Open Faculties for Innovation, Education, Science, Technology and the Arts) programme, co-developed with the Paris-based Centre for Interdisciplinary Research, is an ambitious attempt to use real-world problem-solving as the core of a new approach, dubbed University 2.0. These efforts echo Henry Etzkowitz and his collaborators' call for a Novum Trivium with innovation and entrepreneurship - including the experiential learning represented by undergraduate incubators like StartX at Stanford and the Harvard Innovation Lab - as one of the three pillars of a modern undergraduate education, along with academic specialisation, and a language and culture other than one's own (Etzkowitz, Ranga and Dzisah, 2012).

Building up programmes and methodologies of 'interactive social science' which involve engagement with users, practitioners etc. as active participants in the research process – not just as research subjects or consumers of the final product – will also help build bridges between research and practice. In the most advanced cases this could involve embedding social science researchers on the frontline by building a Researcher in Residence programme throughout the public services. This chimes with the idea of 'flipping academics', recently proposed by the Canadian innovation theorist Alex Bruton as a new breed of researcher that: *"informs first and publishes later;....seeks 'the truth' and 'usefulness' together....[and] works where they need to work"* (Bruton, 2012).

In some senses the 'social science park' aims to reproduce in the social arena the kind of open, collaborative culture that has been intrinsic to commercial innovation success where, according to John Seely Brown who was chief scientist at Xerox, and John Hagel of Deloitte, individual innovators and innovative organisations *"come together and collaborate in evolving networks of creation, or creation nets. They play off each other, appropriating each other's work, learning from it, building on top of it and then watching and learning from what others do with their own creations"* (Brown and Hagel, 2006).

The creation of human knowledge is fundamentally a social process in which knowledge spills over from one field into another, ideas are exchanged, theories challenged, and new concepts born. In the case of much social knowledge, practice is well ahead of theory and the role of the academic is to make sense of practice - to help a community of doers. Proximity is critical. Yet those who generate knowledge often operate in a separate world from those meant to apply it or interpret it. In many ways the social science park is an attempt to bridge this divide, creating an integrated space where the sort of innovation feedback loop set out in Figure 1, iterating between research and practice, thinking-and-doing, the abstract and the real, can begin to happen more organically. The co-location of a variety of different actors helps promote the particularistic and trust-based social relationships and commitment to shared values that are fundamental to collaborative innovative activity (Delbridge, 2007).

Figure 2: **The Innovation Loop**



SPARKs of invention

Like many apparently new ideas, the social science park can boast deep roots and a few false starts. The first mooted attempts to build a fully-fledged SPARK stem from the early 1990s. The London School of Economics (LSE), in 1992, proposed to move from its Aldwych campus to the former County Hall building on the South Bank in order to create what was described at the time as a 'social science park', including the development of research centres and spin-off firms, especially in the area of economic forecasting (in which the LSE had particular expertise), plus a Civil Service training institute modelled on the French Ecole nationale d'administration (ENA). Despite support from the then Trade and Industry Secretary, Michael Heseltine, and a lengthy legal challenge, the site was sold in the end to the highest bidder, a Japanese developer who turned it into a hotel. The LSE invested the cash instead in the purchase of The George IV pub and Dickens' Old Curiosity Shop. Also in 1992, John Hopkins University commissioned a feasibility study for the United States' first 'social science research park' in an ambitious plan to redevelop a venerated former major-league baseball stadium in north east Baltimore. The University's property advisors concluded there was indeed a market need and a good fit with their existing strengths but the distance from the 'primary market' in Washington DC was a significant constraint. The stadium was demolished and a retirement home now stands on the northern end of its outfield.

Despite these faltering attempts, it might be argued now that the time of the social science park has finally come. Momentum behind the idea of creating a new physical infrastructure for the social sciences has built in recent years. Sheffield's Interdisciplinary Centre of the Social Sciences (ICOSS), opened in 2004 and funded with a £5.7 million grant by the Science Research Infrastructure Fund, is a large-scale dedicated facility for social science research, which brings together 13 centres and departments to form an interdisciplinary forum for research and innovation. A similar 'centre of centres' approach lies behind the LSE's recently announced plans for a new £90 million Global Centre for the Social Sciences.

Across Europe, four social science research parks have begun to take shape. Istanbul Medenyiet University, a new public institution established in 2010, has recently announced its plans for a 'Social Cooperation Application and Research Park' (SosyoPark) in the Sultanbeyli municipality in the eastern side of the city. Some of the key principles behind the proposal were summarised following discussions at a foundational conference in 2014. SosyoPark will be a new facility similar to the University's existing technopark and biopark but based on the social sciences. Its objective will be to help society benefit from the knowledge and research ability of the university. This will be principally achieved by: creating solutions for social problems at both national and international levels; supporting collaboration in interdisciplinary research projects; and presenting the concrete results of the research to policymakers. The Park will be managed by the University, though it will be financially independent and other universities, NGOs, and entrepreneurs will be invited to open offices there.

Barcelona's bcn@22 area, a hotbed of innovation built from the rubble of the former industrial area of Poble Nou, will soon boast two new research parks, focused, at least in part, on the social sciences. A new 9,000m^2 research park specialising in the social sciences and humanities (and given the short-hand title Social Science Park in the original proposals) has been established by the fast-rising Pompeu Fabra University, bringing together disparate research centres, including a behavioural science lab, with the aim of promoting interdisciplinary applied research in areas as diverse as the design of institutions and markets, monetary and fiscal policy, the labour market and unemployment, finance, welfare, equality, education, immigration and health. Whether coincidentally or not, the University of Barcelona has announced the development of a parallel €5 million Social Science and Humanities Park, also located in the heart of the @22 innovation district and due to be completed by 2019.

In the UK meanwhile, the University of Lincoln held a pop-up 'social science park' earlier this year and has previously declared its interest in building a more permanent interface for the city and the University, inviting users of research and co-researchers from the third sector, local authorities, the social welfare professions and campaign groups to consider co-locating in a new purpose-built centre for the social sciences .

To our knowledge, the most advanced plans for a dedicated social science research park are at Cardiff University, which has announced its intention to build SPARK as part of a £300million investment in its new innovation campus. The development is underway and the new social science research park is to be co-located with an innovation centre supporting startups and spin-outs. The 12,000m^2 building is expected to be operational in 2018. The mission for the social science park is 'to generate economic, environmental and social value through co-developing innovative and effective solutions to societal problems', and the plans see existing research centres with expertise in regional economic development, education, public health, sustainability, social policy, public services, crime and security, data innovation and computational social science co-located with external research collaborators and an ESRC doctoral training centre. The University's joint initiative with Nesta in public services innovation, Y Lab, will also be located in the SPARK.

CONCLUSION

Optimists might propose that the social sciences can be said to be on the cusp of a new golden age. Indeed, for those who advocate a 'harder' scientific edge to social science, there are several reasons to be optimistic. Vast computational capacity, coupled with Big Data, means society can be observed in all its complexity like never before. Insights imported from other disciplines (including neuroscience and evolutionary biology) have brought with them a new predictive power. Social scientists have (re-)discovered the value of experimentation through virtual labs and randomised control trials. On the demand side there is a new appetite for the knowledge that only social science can generate. There is a growing recognition among policymakers and practitioners alike of the need for innovation in public services and a proper evidence base for policy (Puttick, 2011). This is leading to a renewed focus on the role of universities as part of the pipeline of evidence production and as test-beds for policy evaluation and experimentation. Similarly, the private sector – in a world increasingly defined by social networks, social media and social software – is focused on understanding the (social) science of human interaction like never before.

As John Brewer (2013) has noted, social sciences are uniquely placed, both to explain and inform societal developments. The social science park is an innovation *in* social science as well as *of* social science. The objective is to produce knowledge and public value which is social science-led and oriented to societal benefit. It is thus intended to be a catalyst both for a more innovation-oriented social science and a more socially-oriented system of innovation. While universities are striving for greater societal impact alongside their traditional roles of teaching and research, practitioners are struggling to find new ways of meeting the needs of a changing society. The Social Science Park brings the worlds of theory and practice together in new ways to spark the ideas that will lead to transformational change. Developments at Cardiff University and elsewhere are promising, but it remains to be seen whether this potentially powerful institutional mechanism for addressing the problems and possibilities of our time will be widely adopted.

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