Not Rocket Science:

A Roadmap for Arts and Cultural R&D

Hasan Bakhshi, Radhika Desai and Alan Freeman

Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

The Frascati Manual, OECD

We owe to Schumpeter the extremely important distinction between inventions and innovations, which has since been generally incorporated into economic theory. An invention is an idea, a sketch or model for a new or improved device, product, process or system. Such inventions may often (not always) be patented but they do not necessarily lead to innovations... The chain of events from invention or specification to social application is typically long and hazardous.

Christopher Freeman, The Economics of Industrial Innovation

Productions are workshopped all the time, that don't make the stage. And I think that's really important that that's allowed to happen. I think, as a creative, working on something, it's really wonderful to not think about the end result sometimes.

Marianne Elliott, Making War Horse, National Theatre

The Authors

Hasan Bakhshi is a Research Fellow, ARC Centre of Excellence for Creative Industries and Innovation at the Queensland University of Technology and Visiting Professor at City University. He is also Director, Creative Industries in NESTA's Policy & Research Unit. Radhika Desai is Professor, Department of Political Studies, University of Manitoba and Visiting Fellow, Development Studies Institute, London School of Economics. Alan Freeman is an Economist at the Greater London Authority (GLA). The views expressed in this paper are those of the authors and nothing in this paper implies endorsement either by NESTA or by the GLA.

Acknowledgements

We would like to thank the following for their insightful comments on an earlier draft of the paper: Nick Starr, David Sabel, Graham Hitchen, Terry Cutler, Sara Selwood, Stuart Cunningham, Oliver Bennett, Jon Kingsbury, Jason Potts, Juan Mateos-Garcia, Clare Cooper and Haidee Bell. Any remaining errors are our own.

What We Propose and Why

This paper proposes that publicly funded arts and cultural organisations should aspire to, and be funded to, engage in Research and Experimental Development (R&D), particularly that which aims at innovation, that is, new social application.

Not confined to novel products or processes, arts and cultural innovation will yield altogether new ways in which arts and culture are embedded in the knowledge society and economy. So, for example, experimental development will trial new ways of engaging audiences, or explore new forms of collaboration between producers, and between them and consumers, through digital technologies. It will investigate how arts and cultural organisations can re-imagine their relationship with private sector businesses, social enterprise and public service delivery. In short, arts and cultural R&D will expand the sources of cultural, commercial and public value.

The Two Prejudices

Our proposals challenge two entrenched prejudices which block arts and cultural organisations from playing their full role in society and economy. First, arts and culture are excluded from R&D by definitions based on its Science and Technology (S&T) origins. Second, the arts and cultural sector relies on a conception of creativity that mystifies too much of its work, preventing it from accessing valuable public resources.

The Frascati Manual, the veritable Bible for R&D policymakers, deems R&D to be comprised of *basic, or fundamental research* to acquire knowledge without an application in mind; *applied research,* where knowledge creation has specific practical aims; and *experimental development*, which draws on research to produce new products, processes and systems, that is, social applications. Nothing inherent in the arts and cultural sector excludes them from these activities. Policymakers already conceive of certain non-scientific activities – intangibles like design and brand innovation[1] – as complementing R&D. They must also reconsider the reach of R&D criteria themselves.[2]

[1] Oslo Manual: The Measurement of Science and Technological Activities, Proposed Guidelines for Collecting and Interpreting Technological Innovation Data http://www.oecd.org/dataoecd/35/61/2367580.pdf

[2] Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development http://www.oecd.org/document/6/0,3343,en_2649_34451_33828550_1_1_1_1,00.html

Existing R&D criteria, used by governments the world over, wrongly rule the arts and culture out. For example, the guidelines for prospective R&D tax credit claimants issued by Her Majesty's Revenue & Customs state that

> Your company or organisation can only claim for R&D Relief if an R&D project seeks to achieve an advance in overall knowledge or capability in a field of science or technology through the resolution of scientific or technological uncertainty... Science does not include work in the arts, humanities and social sciences (including economics).[3]

This is wrong. R&D is not rocket science. To do it, Arts Council, England need not install Hubble Telescopes and hadron colliders.

However, not only does the S&T bias of R&D require correction and adaptation to the needs of culture and the arts, arts and cultural organisations for their part must understand and expand the rationale behind existing R&D definitions. This is crucial if their case for R&D funding is not to fall on deaf ears and if they are to rise to the immense opportunities, and also the formidable challenges, of the creative and knowledge economy.

Two changes in particular are necessary: arts and cultural organisations need to expand their R&D activities to cover its full range, particularly including experimental development and they need to recognise that the development of new products or processes, no matter how creative, inventive or socially useful, does not constitute R&D if it remains *tacit*. The Frascati Manual requires R&D to clearly articulate research questions, apply dedicated rigorous methods, and produce replicable findings which can be made explicit for dissemination. The methods and outcomes of arts and cultural R&D must be *explicit and capable of generalisation* across the sector.

This requires arts and cultural organisations to shelve the notion that the sources of art, culture and creativity are necessarily mysterious. Undoubtedly our understanding of human creativity and expression falls well short of understanding their sources fully, and some core of them, even in the sciences, will always remain mysterious.

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[3] http://www.hmrc.gov.uk/ct/forms-rates/claims/randd.htm

Nevertheless, R&D and its outcomes, whether scientific or artistic, cannot be mysterious. They must be explicable, communicable and applicable, not just by their producers but also by others.

R&D can and should be extended to arts and culture in a way that respects the integrity of their work while equipping them for their role in society and economy. This must emerge from a dialogue among the major stakeholders – the arts and cultural organisations and public R&D funders such as the Treasury, the Technology Strategy Board, the Research Councils, and arts funding bodies. It should revolve around four themes: conceptualising the aims and methods of arts and culture R&D; enabling arts and cultural organisations to devote the necessary resources to R&D; identifying which existing activities of arts and cultural organisations qualify as R&D under present criteria; and adapting these criteria – which guide funding decisions – to further the objective of gearing arts and cultural organisations for R&D.

The public value of knowledge

We use the world 'public' in two senses. Insistence on public dissemination of the results of R&D is matched, in our proposals, by insistence on public support for it.[4]

Arts and cultural organisations are no strangers to either. They exemplify social forms we call 'quasi-markets', producing both public and private value and receiving both public and private incomes. Publicly funded R&D will extend the range of their value-creating activities just as it does in S&T-based sectors.

The arts and cultural sector has much to gain from R&D. Decades and even centuries of thinking on R&D, even if science-led, contain indispensable lessons for better managing, expanding and innovating in the arts and culture. As Falk and Shepherd (2006:240) note for the US museum world:

> Every day, the museum community is falling farther behind in its efforts to generate the knowledge that it can use to map out the business strategies of tomorrow... Research and Development, as opposed to market or evaluation research, is intended to create new ideas and open new doors; it is fundamental to helping us understand something about the world we

[4] In this article we use the term 'public funding' in the broadest sense to include direct government finance, academic research grants, tax relief, philanthropic support, special licensing, and in general, all other sources of benefit not directly arising from commercial sales revenue.

> are about to enter... Unfortunately, there is still relatively little Research and Development in the museum world.

Arts and cultural sector R&D will challenge, and eventually replace, an outdated conception of R&D which sees it as the exclusive domain of S&T.

British society has, if anything, even more to gain. Social and technical changes are increasing the prominence of knowledge, creativity, culture and the arts in the economy, whilst digital and other technologies lift constraints of distance and time on participation in the arts. As this process unfolds, the activities of the arts and cultural sector need to be even more embedded in social and economic processes than at present. Incremental strategies will not suffice to achieve this. A constructive process of change requires *knowledge* about their effects, and the systematic *use* of this knowledge to shape the way society and the arts and culture engage. This is what R&D can provide.

The rest of the paper motivates these proposals.

Do arts and cultural organisations do R&D?

Frascati Manual definitions of R&D inform R&D tax credit and subsidy programmes worldwide. Originally written at the height of industrialism in 1963, their S&T focus is understandable though its persistence through numerous updates now needs questioning.[5]

What can the arts and cultural sector contribute in widening accepted definitions of R&D? An example of experimental development in the sector opens our discussion: the National Theatre's June 25, 2009 'live-distance' performance of Nicholas Hytner's production of *Phèdre* to an audience of 14,000 in 73 selected digital cinemas across the UK (see box overleaf).

[5] For example, only 5% of development spending in an even obviously high-tech creative industry like games development qualifies as R&D for tax credit purposes in the UK (Games Investor Consulting, 2007).

NT Live

On 25 June 2009, the National Theatre (NT) broadcast by satellite a live performance to selected cinemas across the country. Nicholas Hytner's production of Racine's *Phèdre* translated by Ted Hughes was beamed to 73 digital cinema screens in the UK and also to 210 abroad. In addition to the audience in the NT itself, 14,000 people across the UK saw that evening's production. An additional 14,000 people also saw it live across Europe or on the same day in North America (allowing for time zone delays). Including cinema audiences in other countries who saw the production at a later date, it is estimated that a staggering 50,000 saw *Phèdre* as it was performed on June 25th. *Phèdre* was the first of four experimental pilots under the National Theatre's *NT Live* programme.

In collaboration with the National Theatre and 35 of the participating cinemas, researchers at NESTA collected detailed survey data for both National Theatre and *NT Live* audiences for *Phèdre* in the UK. The data are aiding a comparative analysis of the experiences of theatre and cinema audiences and are helping to answer questions related to the business model. Specific questions include:

- Can broadcasting live theatre to digital cinemas create new audiences for theatre?
- Does broadcasting live theatre to cinemas 'cannibalise' the theatre box office?
- What pricing strategies might be the most effective at the cinemas?
- Can broadcasting theatre productions develop the art form itself?

The data comprising *stated* preferences of audiences are complemented by statistical and econometric analysis of postcode data for the National Theatre audiences, that is, their *revealed* preferences. The latter permits independent assessment of whether *NT Live* cannibalised existing audiences or stimulated new ones in the catchment of the digital cinemas. While some people could have chosen between seeing the production at the National Theatre or at their local cinema, others – living at a prohibitively long distance from the South Bank – saw it in a cinema or not at all, while yet others – from areas within the commuter belt but not served by *NT Live* – could only have seen *Phèdre* at the National Theatre. As such, *NT Live*'s distribution strategy resembled a 'field experiment', allowing researchers to uncover audiences' preferences in a way that would not have been possible if the pilot had been structured differently.

The National Theatre worked closely with NESTA, endorsing the survey to ensure that the cinema and the theatre audiences each completed over 1000 surveys. The data collected constitute a robust evidence base for assessing the *NT Live* pilot and will feed into the National's evolving digital strategy. The evidence base will be published in its entirety so that other theatre companies can use it when considering live broadcasts of their performances.

Venue-to-venue live broadcast performance is not a new idea – for example, New York Metropolitan Opera performances have been broadcast live for some time. Two features, however, qualify NT and NESTA's research as experimental development. First, it accompanied the introduction of that format to Britain with research *designed to generate*

new knowledge about how this format was deployed and received, so that it could be widely publicised and replicated. Its innovation-driven questions examine the live experience in two types of performance venue at different geographical locations whose audiences would not normally be the same – the National Theatre, the site of production, and the cinemas to which it was broadcast. Second, it was *designed so that this knowledge could be used* to improve the format, create a new product, devise a new business model or forge new relationships between producers and consumers. Widely disseminated to other innovating arts organisations, such knowledge can inform and improve future trials: it becomes a public good.

The UK's arts and cultural institutions engage in world-class and pace-setting research, considerable innovation and even experimental development. However, which of their activities could properly be considered R&D if present Frascati definitions were extended? A full determination can only come from the dialogue we propose. However, three issues may be addressed immediately.

Advocacy is not R&D

Building 'evidence bases' for advocacy is essential for arts and cultural organisations' access to public and philanthropic funding. It is wrongly castigated as necessarily 'instrumental' (see Bakhshi, Freeman and Hitchen 2009). But it is not R&D. Unlike evidence collection for advocacy, R&D must clearly articulate research questions (often aiming to establish causal connections), apply rigorous research methods and – in the case of experimental development – inform new social applications. R&D is a dynamic process of learning aiming at innovation; evidence bases for the purposes of advocacy typically portray existing reality.

Basic Research is part of R&D

Basic research makes explicit and codified contributions to knowledge for its own sake. It is essential for, but does not aim at, social application – that is, innovation.

Most basic research in S&T is conducted by universities. So, for example, according to OECD estimates, private businesses in the US conduct less than 15% of this type of R&D.[6]

[6] OECD R&D Statistics 2008

Universities in the UK also conduct basic research in the arts and cultural domain, and it is rightly funded by organisations like the AHRC, British Academy and Leverhulme Trust. But arts and cultural organisations conduct basic research of their own too (often in collaboration with universities and with funding from relevant research funding agencies). The Natural History Museum, which spans science and culture, employs literally hundreds of research-active scientists. With an extraordinary range of 'research material', it is an obvious centre for basic research.

Basic research in museums with historical or artistic, rather than scientific, collections is fundamentally similar. To take a prominent recent example, the Tate Britain's 2009 exhibition 'Turner and the Masters' was the curatorial outcome of basic research in collaboration with academic art historians which advanced knowledge. It took a fresh look at one of the UK's more widely appreciated painters, his relationship with the reigning masters and styles of his day and how he both engaged and challenged them to establish his own presence and style.

Basic research in arts and cultural organisations can also extend to postgraduate training. According to the British Museum's Annual Report 'Fourteen doctoral candidates were affiliated to the British Museum in 2008/09 from universities in Cardiff, Newcastle, Reading, Southampton and eight other institutions. They are studying English and Classics, Archaeology and Geography, and work with the collection on topics such as medieval coin loss, Islamic trade in the Persian Gulf and male adornment in early modern Europe.'

Like scientific basic research, basic research in the arts may also have unanticipated spin-offs just as space research unexpectedly produced new ways of making shiny sleeping bags and non-stick frying pans.

Creative experimentation per se is not R&D

Experimentation and innovation in content and form are inherent to the arts. There is a sense in which every work is new.

The fruits of artistic and cultural experimentation by one organisation can spill over to the wider creative sector, as creative talent is nurtured and new careers supported. New ideas tacitly filter into wider society through personal interactions and contacts. Theatre director

Marianne Elliott describes the experimental work at the National Theatre's Studio in these terms: 'Productions are workshopped all the time, that don't make the stage. And I think that's really important that that's allowed to happen. I think, as a creative, working on something, it's really wonderful to *not* think about the end result sometimes.' Some of this work is made explicit, as in the NT's documentary, *Making War Horse*.

However, if, as is usual in the arts and cultural sector, the knowledge created and the methods used are neither made explicit, nor codified, nor replicable for extension and use by others, such innovative activity falls short of the requirements of R&D – even if it leads to innovation in the wider creative economy[7].

Of course, ambiguity remains: To what extent and by what rationale can creative experimentation activities be considered R&D, if at all? What does the process of 'making explicit' or 'codifying' mean in an arts and cultural context? What other forms of R&D are needed in arts and cultural organisations? What new forms of social embedding can help extend the production and consumption of artistic and cultural activities? What sorts of research questions do arts and cultural organisations need to address using R&D? Only the dialogue we propose can clear this up[8].

Why arts and cultural R&D now?

The idea that 'the future has arrived' may be commonplace but is rarely spelled out. A confluence of technical and social factors today pose unprecedented challenges and opportunities for the arts and cultural sector which they cannot meet without R&D. 'Purely technical' factors, such as the arrival of the internet, enable some art forms to expand their

[7]In this sense, we take issue with Geoffrey Crossick's acclaimed essay on knowledge transfer in the arts which argues that "what is needed is not a system to transfer from one party to another some knowledge that has already been produced, to transfer something that has already happened. But, rather the need is for a system to create spaces in which something can happen. In the creative industries, much of the time, once it has happened, it has already been transferred." (Crossick, 2006: 17). Undoubtedly the arts have their own forms of experimentation. Undoubtedly there is considerable implicit knowledge creation and transfer that takes place through them. Equally undoubtedly, much, or at least some, of this is, and will remain, implicit and uncodifiable. What we do question, however, is whether all knowledge creation and transfer processes in the arts are beyond explication and codification and whether implicit and non-codified knowledge creation and transfer can qualify as R&D

[8]Tim Joss also notes that – in contrast to the sciences – artistic method "has never been laid out and universally accepted." (Joss, 2008: 33)

audiences without limit. More broadly, in almost every branch of production, what economists call ‘intangible’ aspects of products – aesthetic, design and cultural – are coming to prevail over purely material production and consumption (Haskel *et al* 2009).

The mould of postwar society was long in the breaking and we may be poised at the tipping point of accumulating changes. In the 1970s sociologists such as Daniel Bell heralded ‘post-industrial society’ in which services rather than manufacturing predominated (Bell 1973). From the 1980s onwards, other characterisations emerged. Geographers, sociologists and cultural studies aficionados spoke of ‘post-Fordism’: Fordist society, based on assembly-line production of mass consumer goods that supported Keynesian welfare states and ‘high mass consumption’ societies (Rostow 1960), was replaced by an era of greater choice, personal freedom, flexible methods of production and niche marketing (Scott 1988, Sabel 1982, Piore and Sabel 1984, Harvey 1989), if also greater inequality. Political scientists proclaimed the arrival of an era of ‘post-materialist’ values in which new constituencies escaped traditional party boundaries and formed new social movements (Offe 1987). Yet others spoke of post-modernity (Jameson 1998, Anderson 1998) investing artistic post-modernism with social, economic and political significance. Whether it was ‘the cultural logic of late capitalism’, characterised by ‘schizophrenia’ and ‘pastiche’ (Jameson 1991) or ‘scepticism towards meta-narratives’ (Lyotard 1984), post-modernism bespoke broader changes. What united all these diagnoses was a sense that ‘culture’ – knowledge, creativity, the arts but also the sciences – were becoming more important in society and economy.

Technology was critical – it increased manufacturing productivity and released more and more of the workforce into the service sector or, as with digital technology, supplied the infrastructure for new forms of production, including cultural production. In some accounts it drove social change. While New Economy apostles focused on the Internet, others, such as Carlota Perez, produced broader, more complex understandings. Successive ‘technological revolutions’ put society through exciting and painful changes: each ‘require[d] ... the establishment of an adequate socio-institutional framework’ because ‘[t]he existing framework, created to handle growth based on the previous set of technologies, [was] unsuited to the new one’ (Perez 2002: xviii).

Key elements of these intuitions have endured. While of course manufacturing remains a

critical economic sector in developed countries (just as agriculture is, despite the industrial revolution), services dominate the contemporary economy. Production, including the production of goods, also takes on new, creative and cultural, forms (Freeman 2008). While the number of workers primarily deploying creative, cognitive or knowledge skills has grown, practically all work now requires these skills to some extent.

These changes bring new challenges and opportunities for the arts and cultural sector. Artistic and cultural activity is rising as the larger creative, cognitive and knowledge-based workforce consumes and, in parts or all of its time, produces, art (Andari *et al* 2007). But this also requires that the arts and cultural sector is more fully integrated with others – whether industry or education, community services or health, that is, in the deployment, training, support or healing, of a society's population and workforce (Higgs *et al* 2008).

Much of this embedding will take hitherto unknown technological and social forms (Arvidsson 2009). These offer opportunities for extending the production and consumption of the arts to previously unreachable constituencies. But major obstacles, such as the sheer scale of resources needed to deploy new digital technologies, stand in the way of realising this potential. This problem we term *radical uncertainty.* The problems facing the music and film industries are well known, but radical uncertainty is taking even traditional arts and cultural organisations, such as libraries and museums, in entirely new directions such as social networking and the curation of user-generated artistic content. The British Museum, the UK's number one visitor attraction, for example, had 5.5 million visits in 2008, of which 2.3 million were from UK visitors. But, including visitors to its learning sites, *Ancient Civilisations*, it had 13 million visitors online (British Museum, 2009).

New business models

The variety of forms for socially embedding the arts and culture in other sectors and in communities requires fundamentally rethinking the way arts and cultural organisations respond to, *and how they can lead*, economic and social change (Fleming 2009). This context makes R&D necessary for arts and cultural organisations.

How can arts and cultural organisations respond? Fundamentally, they need to re-think their 'business model'. Hitherto restricted to commercial ventures, the term is increasingly accepted in artistic and cultural management circles. Falk and Sheppard's (2006) definition

readily extends to most arts and cultural organisations which operate in quasi-markets and produce both commercial and public value. A business model is

> a description of the operations of a business, including the purpose of the business, components of the business, the functions of the business, the core values of the business, and the revenues and expenses that the business generates. A business model is the mechanism by which a business intends to manage its costs and generate its outcomes – in the case of for-profits, the outcomes are primarily revenues earned, and in the case of nonprofits, the outcome is primarily the public good created. (Falk and Sheppard 2006: 18)

All arts and cultural organisations operate on the basis of a certain 'knowledge' about their audiences, resources, and paths of adaptation. For example a public library, with no sales revenue, has an audience (its readers), resources (books and buildings), and systems for getting the resources to the readers – indexing, cataloguing, shelves, and indeed, 'Quiet' signs, carrels, and so on. When spelled out systematically and deployed in a plan of action, this is its business model.

Trialling new business models is urgent, as social and technological change makes old, often implicit, business models irrelevant. As librarians respond to digital technologies and changing usage patterns, they are developing sophisticated techniques for reacting to them with, in effect, new business models.

Proper, informed, structured R&D is needed for arts and cultural organisations to ride such great waves of change. It goes beyond mere individual artistic creativity, just as the knowledge needed to run a railway line so vastly exceeds the knowledge needed to build a locomotive, or the knowledge needed to electrify whole nations goes so far beyond the knowledge that produced the dynamo and the light bulb.

Why public? Knowledge creation as a public activity

Although our proposals also have consequences as far-reaching for commercial arts and cultural organisations, we emphasise 'public' for two reasons.

First, the arts and cultural sector *by its nature* depends significantly on public or philanthropic funds, not because it is inefficient, nor because its products are not in demand

but for a variety of reasons – most critically because it produces *public value* (Moore 1995, Towse 2007). Even private philanthropy is motivated by considerations of public benefit. Secondly, the beneficiaries of artistic and cultural activities include not merely individual consumers but society itself.

In producing an inextricable combination of private or commercial value and public value, and receiving private as well as philanthropic and public income, arts and cultural organisations operate in quasi-markets.[9] The film industry, for example, has historically received public support mainly because both the production and consumption of film is a cultural good which delivers public value. Even though this funding has helped increase revenues, this has not been its primary purpose.

Of course, the public and private sectors have never monolithically faced one another (Hutton and Schneider, 2008). Markets are complex amalgams of private activity and public regulation, support and even direct provision. And, more than ever before, a 'distributed' (Scott 2008, Murray 2009) social economy of state provision and civil participation operates at all levels of public provision in increasingly complex 'socialised' (Elson 1988, 2000) quasi-markets. This is the environment in which *social* enterprise operates, delivering a mix of public and private/commercial value, and receiving a mix of public and private finance.

Such distributed quasi-markets have long been the native habitat of arts and cultural organisations. So much so that Jason Potts and his co-authors propose forsaking traditional definitions of the creative industries in terms of creative inputs and intellectual property-governed outputs for one centring on 'social networks' of distributed quasi-markets: 'The set of agents in a market characterized by adoption of novel ideas within social networks for production and consumption.' (Potts *et al* 2008: 171). Such a definition cuts through the myriad problems of standard definitions, for example arbitrarily deeming some activities 'creative' and others not, and instead conceives creative industries in terms of their *form* or *mode* of activity.

If the inevitably public character of the sector is one reason for insisting on public R&D for arts and cultural organisations, the vast benefits of creating a public or common pool of

[9] Increasing numbers of arts and cultural organisations are adopting innovative financing structures which move beyond the public-private dichotomy e.g. through establishing themselves as Community Interest Companies which are less constrained than charities in their use of equity instruments (Bolton and Carrington, 2007).

R&D in the sector is another. Investment in R&D is part of any venture's business model. Organisations can approach how they make this investment in a variety of ways. One extreme is to keep R&D and its results secret or acquire intellectual property in them, to develop products that will increase commercial revenue. This kind of R&D is common in S&T-based sectors which have developed a form of intellectual property almost unknown to the arts (where in contrast copyright protects the expression of ideas) – the patent.

However, an organisation whose goal is to keep its results secret cannot realistically expect public funding. As James Boyle argues, 'the explosion of industrial technologies that threatened the environment also taught us to recognise its value. The explosion of information technologies has precipitated an intellectual landgrab; it must also teach us about both the existence and the value of the public domain.' (Boyle. 2008: vx). Knowledge sequestration in the arts and cultural sector would not only be a travesty, but also contrary to the nature of a branch of society by nature communicative and collaborative. The lessons of publicly funded R&D should be meaningfully shared across the sector.

Dissemination can take a number of forms, as it does in the S&T industries. One is, of course, simple and open publication. Others include franchising it to other, smaller arts and cultural organisations, less suited to conduct large-scale research. The key point is that the knowledge be shared. This means it must be made explicit and have clear mechanisms for dissemination.

What might an arts and culture R&D model look like? Pushing the S&T envelope

The problem is not just one of bringing R&D to the arts and cultural sector. The sector also needs to be brought into R&D. The result promises a wider and more versatile conception of R&D for the economy of tomorrow.

R&D has three aims: to extend human knowledge; to apply it to produce useful inventions; and to experiment with ways to embed invention in society, that is to innovate. Innovation is an activity which aims to increase the benefit – value – which society in its broadest sense can draw from knowledge and invention.

To innovate is to determine, at least to an extent which makes taking a certain risk rational, what one cannot know in advance – that is, how a 'device, product, process, or system' will work *in its context*. Innovation is reducible neither to basic nor applied research ('how does it work?' or 'how do I make it?') nor yet to market research ('will it be popular?'). And today it must range far beyond those directly affected by a single new application.

Received understandings of innovation – whether in Schumpeter, the Oslo Manual or the Community Innovation Survey – focus on developing products, processes or systems. They are unconcerned with how society uses the products. Their conception of the economy – with its clear demarcations between producers, producers and consumers, intellectual and manual labour and public and private – was probably never valid and its limitations are especially clear in the knowledge economy.

Increasingly policymakers accept that producers collaborate with each other to innovate (DIUS 2008). But other demarcations are also breaking down. Social and economic processes are increasingly governed by intangibles – cultural and aesthetic – and design and branding are integrated into 'soft innovation' (Stoneman 2009).

The arts and cultural sector serves, in some ways, as a model for such new economic forms. Let us explain.

The car may originally have been devised to get around faster. But its effects rippled farther across society and some of them were quite perverse: for example the speed of traffic in London today is no greater than in 1912. But the car changed *society*. It brought the modern city, the road system, the oil industry, petrol stations, garages, suburbs, and driving holidays. All major innovations – the railway engine, electricity, household gadgets and communications devices – transformed both individuals and societies. Something of this wider social context is captured in Perez's conception of changes in techno-economic paradigms which break 'existing organizational habits in technology, the economy, management and social institutions' (Perez 2002: 7). It tells us that *the importance of any innovation lies not only in workplace changes within, or in new collaborative relations between, producers, but in the pattern of social change that arises from its production and consumption.*

Conceived in this manner, innovation even in S&T industries becomes considerably more complex. No longer merely about developing new products, processes or systems – better kettles, better administration or new banking systems – with delimited parameters of social application, innovation enters into the usually uncharted terrain of ongoing and emerging social processes which it may, and may be designed to, radically transform or reorient.

The possibilities are immense. Arts and cultural organisations working with, rather than against, its grain, can lead social change towards a society more suffused with culture. They can embed themselves more purposefully and fully in ongoing social processes, and can create new ones. By learning from R&D-intensive industries, by allocating funds and specific intellectual resources to experiment and understand emerging ways – aesthetic, social and technical – of satisfying evolving needs and demands and creating new ones, they can create their own knowledge about the changing sources of value in new forms of artistic experiences and apply it to yield innovations – new processes, products and systems – for delivery.

Our vision recalls 19th century romantic social ambitions that envisaged ever heightened levels of the production, and ever wider spheres for the distribution, of culture – both artistic and scientific – leading to 'the cultivation of all the qualities of the social human being.' Their goal was nothing less than the 'production of this being as the most total and universal possible social product, for, in order to take gratification in a many-sided way, he must be capable of many pleasures [*genussfähig*], hence cultured to a high degree' (Marx 1973).

This has ever been the greatest cultural challenge and today, more than ever, the arts, along with all other cultural sectors, have the opportunity to rise to it. R&D can help them discover and exploit these opportunities. They cannot let them slip from their grasp.

The techniques they use will need to be fit for purpose. Those which tell us how consumers' experience of supermarkets can be improved may not tell us how the Tate attracts significantly more visitors online than visitors to its galleries, or explain the National Theatre's success in live broadcasts of *Phèdre*. But it is at least as important for society to find these answers as for Tesco to understand how Clubcards can build consumer loyalty. How might this be done practically? We turn to this in our final section.

Towards a Blueprint for Arts and Cultural R&D

While only the dialogue between stakeholders we propose can come up with a satisfactory and worked-out conception of arts and cultural R&D, the parameters below follow from our discussion above.

1. R&D should become part of the core mission of arts and cultural organisations.
2. R&D in the sector should be publicly supported.
3. Public R&D support should be extended to all arts and cultural organisations, large and small, and, critically, to networks that may involve individuals, organisations and projects, because innovations need to suit all their sizes and varieties. Of course, not all arts organisations may be able or willing to conduct R&D, but all should develop some capacity to use it.
4. The terms of public R&D funding should normally expect that its methods and results – regardless of success or failure, or of the private stake in the organisation conducting it – be disseminated to create a common pool of arts and cultural R&D. Forms of dissemination may include 'publication', including in digital form, and others which emerge through the proposed dialogue of stakeholders and arts and cultural organisations.
5. As a start, funding should be directed mainly towards organisations that are well placed to deliver R&D which is relevant to the wider sector and are well placed to create R&D capacity.
6. These organisations would then become, for the arts and cultural sector, what the BBC is to its audiences: *Public Service Content Providers.* Public service content is content of public value which would not be provided in a free market. Many in the sector have been demanding public support by drawing parallels with the BBC and pushing for their organisations to be recognised as public service content bodies (DBIS 2009). We support this, but we propose that such content include publicly funded and publicly disseminated R&D.
7. These public service content providers should trial and prototype large-scale and high-cost innovations reducing the risks for the wider arts and cultural sector.
8. Investing in arts organisations' capacity to engage in and/or absorb R&D is critical.

This capacity varies greatly: with important exceptions such as the National Theatre, most are restricted to basic research, if they conduct R&D at all. The public service content providers (see point 6) should also establish R&D capacity for the sector – an organised professional body of R&D personnel and expertise. *Research and training partnerships*, with the academic world, government and research funding bodies like the ESRC and AHRC and the Technology Strategy Board will be instrumental to creating this capacity.

9. Such partnerships and their ethos would enable the *co-creation* of knowledge between researchers and arts and cultural organisations.
10. To be recognised as such by peers, analysts and policymakers, R&D by arts and cultural organisations needs to adopt the best characteristics of R&D in the sciences: clear research questions, research discipline, engagement with skilled researchers, commitment in terms of time and money, access to technology know-how, and, last but not least, investment in the skills needed to trial new business models.

Realising this vision of arts and cultural sector R&D is a mammoth undertaking. The dialogue we propose among major stakeholders – leaders in the arts and cultural sector, the Treasury, the Technology Strategy Board, arts and cultural funding bodies such as the Arts Councils and MLA, and the academic Research Councils – will be critical to its success.

Funders like the Arts Councils, ESRC and AHRC (which on its own spent almost £3.4 million on Knowledge Transfer Awards in 2007/8) could usefully kick-start the process by funding a number of suitable experimental R&D pilots – an obvious place would be in the area of Digital Innovation. Even a handful of good pilots, rigorously structured along the lines that we take for granted in science contexts could together generate valuable insights into the nature of R&D processes in the arts and culture and constitute a powerful case for public R&D spending in the arts and cultural sector.

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Designed by **GP Wolffe**

Published in 2009 by **MMM**

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