$(C^2I)^2$ = CCI-CCI
Creative City Index

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See: http://www.bjast.ac.cn/yiyEnglish/Html/Article/20081007/472.html

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The CCI Creative City Index 2012

John Hartley, Jason Potts
and Trent MacDonald
with Chris Erkunt and Carl Kufleitner

ARC Centre of Excellence in Creative Industries and Innovation (CCI)
Queensland University of Technology (QUT), Brisbane, Australia

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The ARC Centre of Excellence for Creative Industries and Innovation (CCI) is a global leader in research on the role of the creative industries in creating a more dynamic and inclusive innovation system and society. It is a broad-based, multidisciplinary and internationally focused centre embracing basic theoretical and applied research in media, cultural and communication studies, law, education, economics & business, and information technology. It addresses key problems and opportunities for Australia, the Asian region and beyond, arising from innovation in and through the creative economy. The CCI is primarily funded through competitive grants from the Australian Research Council. It is one of the few ARC Centres of Excellence based in the Humanities & Creative Arts, or the Social Sciences.

ABOUT THE AUTHORS

John Hartley AM, FAHA is Professor of Cultural Science and Director of the Centre for Culture and Technology (CCAT) at Curtin University in Western Australia. Previously he was an ARC Federation Fellow and Distinguished Professor at Queensland University of Technology, Research Director of the CCI and Dean of QUT's Creative Industries Faculty. He is at the forefront of international research in the uses of media, having published over twenty books in media, journalism, cultural studies and the creative industries, most recently *Digital Futures for Cultural and Media Studies* (Wiley-Blackwell 2012).

Jason Potts is Principal Research Fellow at the CCI, at QUT, as well as a Senior Lecturer in the School of Economics at the University of Queensland. His work focuses about applications of economic theory to the study of creative industries, with particular focus on market dynamics and innovation processes. His most recent book is *Economic Evolution and Creative Industries* (Edward Elgar 2011). He has over 80 publications.

Trent MacDonald is a research assistant with CCI and a PhD student with the School of Economics at the University of Queensland. His research interests relate to evolutionary and complexity economics, political economy, and the economics of sport and culture.

Chris Erkunt is a research assistant with CCI and a Master's Degree graduate with the School of Economics at the University of Queensland. His research interests relate to the Chinese economy in a global context, especially financial integration and development.

Carl Kufleitner is a research assistant with CCI and holds a Bachelor's Degree in Economics from the University of Queensland's School of Economics.

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- Cities rise and fall; rapidly urbanizing world; cities compete for globally mobile human capital.
- Cities compete on many dimensions: The CCI Creative City Index aims to capture these dimensions.

Chapter 2 Critical Review of the City Index Industry

- Many extant indices (23 reviewed). Two classes: 'stock' indexes focusing on cultural and creative assets (e.g. Florida Creative Cities Index); and 'flows' indexes focusing on broader city services, innovation, ICT and global integration (e.g. Global Power City Index).
- 16 city index dimensions: cultural tourism; creative industries; cultural capital; venues; liveability; transportation; globalization; openness; human capital; social capital; government; business & economy; entrepreneurship; innovation & research; technology & ICT; environment.
- Global city index construction is a new, emergent industry. Not all of the current indexes are expected to survive. But no long-running dominant indexes.

Chapter 3 Elements of the CCI Creative City Index (CCI-CCI)

- Global cities evolve out of creative cities. Creative cities organically develop. We caution against the 'real-estate' model of city development.
- We develop a theory of the 'value chain of meaning' from pre-modern, to modern and to global cities.
- We explain the shift from 'creative clusters' (CI-1) to 'creative services' (CI-2), to 'creative citizens' (CI-3), to 'creative cities' (CI-4).
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- A pilot is estimated on six cities; one metropolitan and one provincial in each of three countries: London & Cardiff (UK), Melbourne & Brisbane (AUS), and Berlin & Bremen (GER).
- The eight dimensions:
    1. Creative industries scale & scope;
    2. Microproductivity;
    3. Attractions & economy of attention;
    4. Participation & expenditure;
    5. Public support;
    6. Human capital;
    7. Global integration;
    8. Openness, tolerance & diversity.
- We outline the methods and data used to estimate each index dimension.
- Three of our indicator suites – CI scope, microproductivity, & economy of attention – are entirely novel inclusions in creative city index construction.

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- The CCI-CCI index is efficient and robust.
- Some issues likely with equivalent measures (particularly of social media) in China; and potentially in other jurisdictions.
- The index accords mostly with intuition, with London dominating on most dimensions. Berlin and Melbourne are comparable.
- The Index will improve in efficiency with the benefit of (a) longitudinal trends among the cities analysed; (b) a wider comparative array and diversity of cities indexed.

0.2 Overview

The CCI Creative City Index (CCI-CCI) is a new approach to the measurement and ranking of **creative global cities**. It is constructed over eight principal dimensions, each with multiple distinct elements. Some of these dimensions are familiar from other global city indexes, such as the MORI or GaWC indexes, which account for the size of creative industries, the scale of cultural amenities, or the flows of creative people and global connectedness. In addition to these indicators, the CCI-CCI contributes several new dimensions. These measure the demand side of creative participation, the attention economy, user-created content, and the productivity of socially networked consumers.

Global creative cities can often seem alike, in respect of per-capita measures of factors such as public spending on cultural amenities, or the number of hotels and restaurants. This is to be expected when people and capital are relatively free to move, and where economic and political institutions are broadly comparable. However, we find that different cities can register far larger differences at the level of consumer-co-creation and especially digital **creative 'microproductivity'**. To explain this finding, we review the logic and rationale of creative and global city index construction and present a review of previous and contemporary indexes.

We set out the case for our new model of a **creative city index** by showing why greater attention to consumer co-creation and microproductivity are important, as well as examining how these factors have been previously overlooked. We show how we have

measured these additional factors and indicate the effect they have on creative and global city indexes.

We then present the findings from a **pilot study of six cities**, two Australian, two German and two from the UK, to indicate how the new index is calculated and applied. Our results indicate much greater variance arising from the new arguments between cities.

Competitive global cities

A key insight that all city indexes point to, as ours most certainly does, is that creative global cities are increasingly engaged in **intense competition with each other** in the evolving process of **globalization**.

Globalization is a centuries-long process that results in the increased interdependence of peoples' economic, cultural, social and political lives. Globalization progresses as 'factor mobility' increases, and accelerates when **people, capital, money and ideas** are free to move about the world to settle where they are most valued. In the past few decades the world has experienced its greatest wave of globalization. Mobility is at unprecedented levels.

From 2008 a majority of the world's population – over 3 billion people – now lives in cities, making humanity an urban species for the first time (UNFPA 2007). In completely new ways and at unprecedented scale, **human experience is city life**, a reality to which current thinking and policy settings have not yet adjusted:

> The process of globalization has also drawn attention to the productive potential of cities and to the human cost. Yet the enormous scale and impact of future urbanization have not penetrated the public's mind (UNFPA 2007: Introduction).

Mobility, urbanisation, and technology have converged on the contemporary city, which, although fixed in place, is best analysed as a dynamic hub in a global network. Every place is now connected to every other place, and so, therefore, is every person. Interestingly, that means that cities are now the most important unit of social-cultural and economic organization.

It also means that cities compete globally. Nation-states are no longer the key units of global competition; instead, cities compete with one another for valuable scarce factors of production. The most important factor, by far, is 'human capital' – **enterprising, talented and creative individuals**. The focus of modern globalization is creative people; and creative cities are the product of their interactions, driving socio-cultural and economic evolution.

Competing city indexes

That globalization is a selection mechanism on cities is the key insight that underpins contemporary attention to the measure of a city's creative output and potential. The demand for and development of such indexes has burgeoned in the past decade (see chapter 2 of this report). Yet a central challenge remains: what is the effective measure of a creative city? This has turned out to be a surprisingly difficult question to answer. It is not simply a matter of adding up a city's capital infrastructure and knowledge exports, or adducing a measure from population size, although these factors are important. Degrees of openness and diversity also need to be included in any measure of a global creative city. These have been key additions contributed by the most influential players, the Florida, MORI Foundation and GaWC indexes. The current state of the art is that manufacturing-based indexes have been updated to account for the openness, global integration, attractiveness and liveability of a city to produce much improved measures of global city indexes and rankings.

Yet there remain significant gaps in this enterprise, most notably in accounting for consumer imagination, user co-creation and amateur production, and the social learning dynamics of the creative citizen, who is connected both to 'small world' networks (see e.g. Ormerod & Wiltshire 2008) and to global complex systems via digital social networking, including digital platforms like Facebook (Potts et al 2008a). These factors remain unaccounted in current indexes for at least two reasons: (1) they are difficult and seemingly subjective measures to make; and (2) in traditional industrial economics there was little reason to suppose that these factors mattered.

Our work at the CCI, particularly through the intellectual framework developed in John Hartley's Federation Fellowship program (e.g. Hartley 2009; 2012), has highlighted the increasing importance of what we call here 'microproductivity' in the cultural, social

and economic impact of the creative industries. The work of Jason Potts on the drivers of economic evolution has reinforced this observation, which further recognises the 'situatedness' of productive creativity (Potts et al 2008b; Potts 2011).

Between them, these approaches indicate that 'consumer' activities, the non-professional creative productivity of ordinary citizens in digitally linked social networks, should be regarded as part of the **innovation system** of complex cultural economies; and that the paradigm example of such systems is the contemporary world city.

Cities are crucibles of everyday human inventiveness through the rapid experimentation, market feedback and social copying processes that drive creative endeavour. Some cities do this better than others, and those that do can become great creative cities.

But how do we recognise this 'on the fly', as the processes unfold, and as novelties emerge? How can we identify when and how a city is doing well, even as it is doing so? That is the purpose of a creative city index. This report will present an analysis of why we need a better index model, and a working prototype of such an index.

The challenge lies in selecting a set of indicators to feed critical information to a dashboard index, including one that can measure a city's absolute performance (how creative?) and its relative performance (compared with which other cities?). The report details our endeavour to construct such an index from first principles, along with the rationale for why we have included the indicators that we have.

Most important, we present a worked example of the index applied to six cities – two each from Australia (Brisbane & Melbourne), Germany (Bremen & Berlin) and the UK (Cardiff & London). We chose London because it regularly features in the top three of any index of global cities (along with New York and Tokyo); but by the same token it is far from typical. Thus, we paired it with Cardiff, a more compact city that is also a capital and has its own claims to creativity. We wanted to compare different countries, not least because each has its own peculiarities in the collection of data and compilation of statistics, not always in English. So we have chosen a pair of cities – one metropolitan and one provincial – in each of three countries, not all of them Anglophone: Australia; Germany; the UK.

Our index is calculated and presented as unweighted, in that the summation weights given to each of the 8 index components are equal. That is because we have no priors relating to the relative importance of each component to add to this. Yet even without such calibration, we propose that its raw form offers a superior measure of the creativity of a city compared with other indexes, by assembling not only its industrial output and its cultural attractiveness – these are the two factors that dominate extant indexes – but also the contribution of its creative citizens. We believe this third impulse to be the main motive and driving causal factor in creative city development.

Our index is built on an approach that can be dubbed 'cultural science'.[1] It integrates both economic and cultural analysis and uses an evolutionary and complex systems based framework. It recognises that a city is creative to the extent that it is complex, dynamic, and capable of evolution. The inputs into the index are appropriate indicators of evolutionary complexity in cities. This analytical approach makes our framework superior to the aggregation-based approaches of other creative city index designs.

0.3 Method and Findings

We show how we have measured these additional arguments and indicate the effect they have on creative and global city indexes. We then overview the findings from a pilot study of six cities (two Australian, two German and two from the UK) to indicate how the new index is applied. Our results indicate much greater variance arising from the new arguments between cities.

Our findings are summarized in the following table and figures.

[1] See http://cultural-science.org.

Table 1: Summary of CCI Creative City Index Results

CCI CREATIVE CITY INDEX	Brisbane (AUS)	Melbourne (AUS)	Berlin (GER)	Bremen (GER)	Cardiff (UK)	London (UK)
1. CREATIVE INDUSTRIES SCALE, SCOPE & EMPLOYMENT	49.8	54.4	53.4	49.2	51.7	96.6
2. MICROPRODUCTIVITY	37.0	41.8	56.3	39.2	49.2	83.6
3. ATTRACTIONS & ECONOMY OF ATTENTION	15.7	30.8	54.9	12.6	10.7	97.8
4. PARTICIPATION & EXPENDITURE	37.0	41.5	69.5	54.6	37.8	79.8
5. PUBLIC SUPPORT	100.0	80.1	77.3	79.3	68.5	94.4
6. HUMAN CAPITAL & RESEARCH	41.8	48.9	75.2	54.8	50.2	75.6
7. GLOBAL INTEGRATION	40.5	52.2	46.0	28.3	25.4	76.7
8. OPENNESS, TOLERANCE & DIVERSITY	67.5	76.0	74.0	70.5	63.6	76.5
CCI CREATIVE CITY INDEX	**48.7**	**53.2**	**63.3**	**48.6**	**44.5**	**85.1**

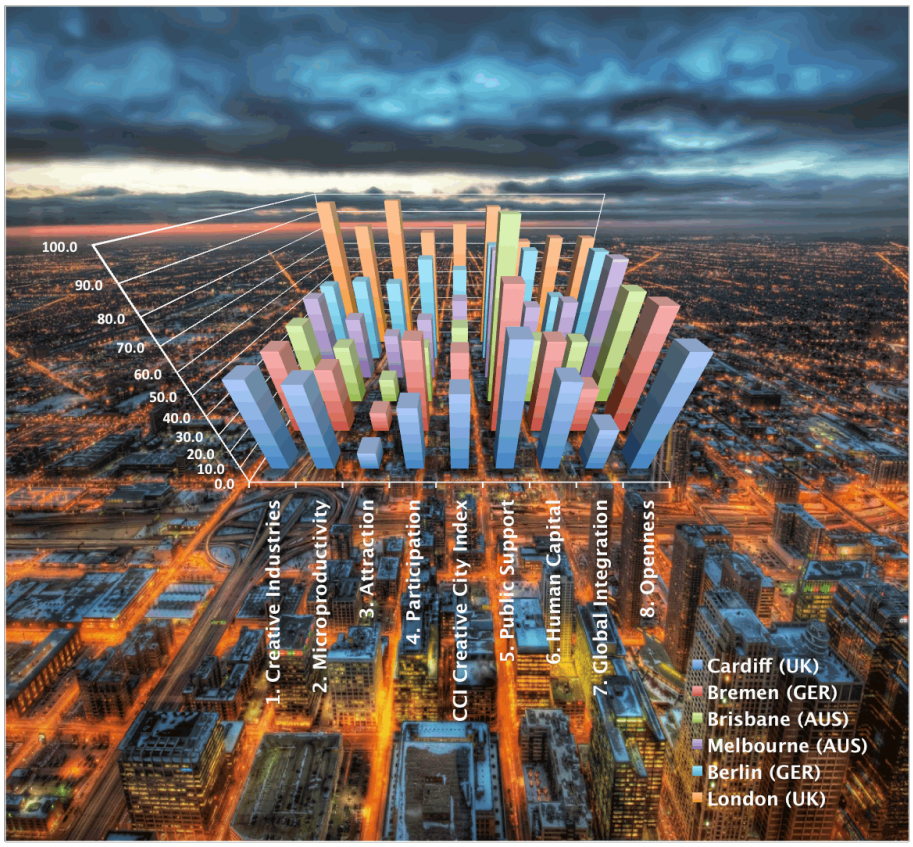

Figure 1: Summary of CCI Creative City Index Results (3D Column)

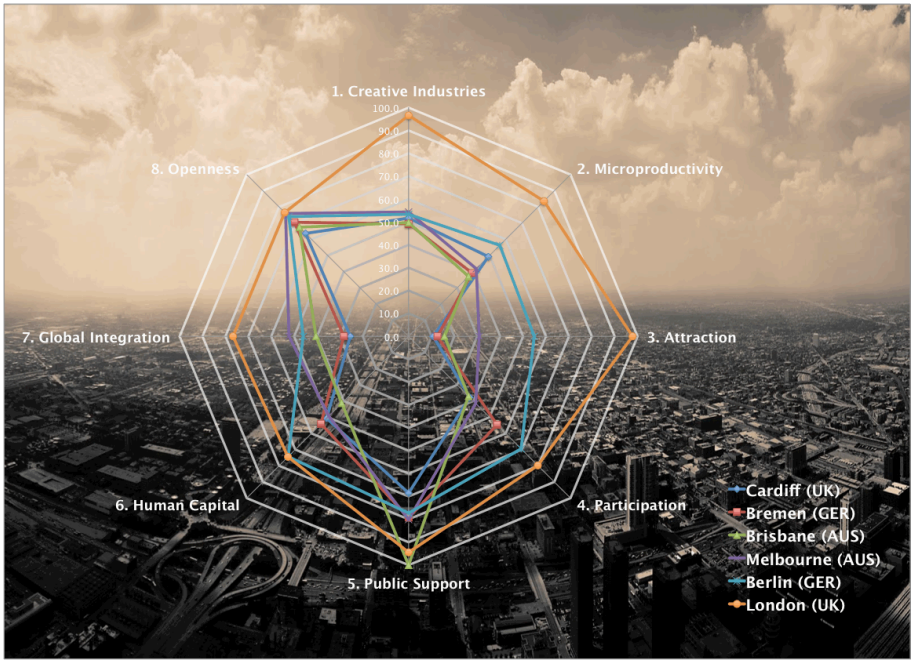

Figure 2: Summary of CCI Creative City Index Results (Marked Radar)

0.4 Context and Scope of the Project

In September 2010 the Beijing Research Centre for Science of Science (BJSS),[2] through Director Zhang Shiyun, commissioned the CCI, through Research Director John Hartley, to develop a framework for a Creative City Index.

The work has been carried out by Prof. Hartley, Dr Jason Potts (CCI Centre Fellow) and Trent MacDonald (CCI Research Associate), with the assistance of BJSS researcher and CCI postgraduate Angela Lin Huang. Research assistance for the population of the indicator suites was provided by Chris Erkunt and Carl Kufleitner of the University of Queensland.

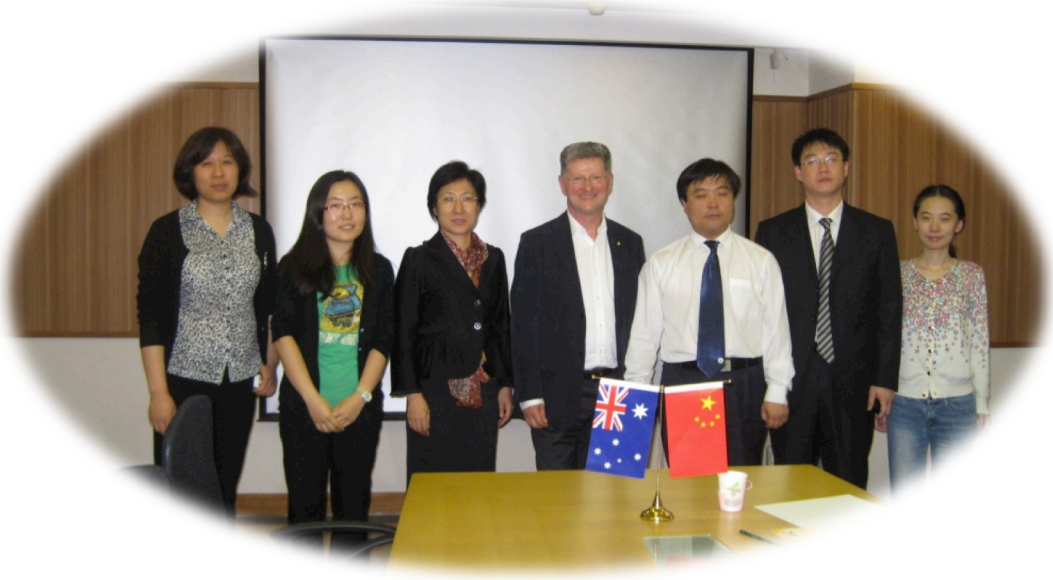

Figure 3: The CCI-BJSS agreement is signed in Beijing, September 2010[3]

The report surveys the modern development of city rank indexes and outlines the method and theory for the construction of an improved city index that identifies *creative* (world) cities. The aim of the report is to produce a comparative assessment of city indexes and rankings, showing what data have been used to generate each index,

[2] CCI: www.cci.edu.au; BJSS: www.bjss.org.cn.

[3] Present are, from left to right: Dr. JIANG Nianyun, Research Fellow at BJSS; Angela Lin HUANG, PhD Candidate at QUT & Research Fellow at BJSS; Dr. LI Li, Director of International Collaboration Division, Beijing Academy of Science and Technology; Prof. John Hartley, CCI-QUT; Dr. ZHANG Shiyun, Director of BJSS; LUO Xin, Deputy Secretary of BJSS; ZHENG Yi, Research Fellow at BJSS.

and highlighting the extent of creativity and cultural indicators. We outline our initial construction of an alternative suite of indicators and index construction methods.

We have sought to produce a 'Creative City Index toolkit' for the municipal government of Beijing to use in domestic and international creative city benchmarking and comparison, thereby to promote policy settings that will cultivate a creative and cultural environment of world-class standing, with the strategic aim of transforming Beijing into a leading global creative city. The CCI Creative City Index (CCI-CCI) is designed to measure and track a city's creativity over time, to make comparisons with peer and exemplary cities worldwide, and to provide a mechanism whereby cities can be internationally ranked.

The index will be used as follows:

- to provide a more comprehensive rank of a subset of global cities;
- to improve policymaking and implementation;
- to foster the expansion of creativity and innovation in Beijing;
- to assess the effectiveness of support for the creative sectors;
- to provide a tool for those whose goal is to transform Beijing into a renowned global creative city.

Beyond this immediate purpose, the CCI-CCI indexing tool can be adapted on demand to provide a creativity score and ranking for any city. Its further development outside China will be the responsibility of the CCI.

The work underlying the development of a *Creative* City Index poses important new questions: What is creativity? What is the creative sector of the economy? What is a creative city? And what is the creative contribution of ordinary citizens? These questions form the context for this report. The CCI Creative City Index toolkit is framed by the recent conception of creativity and the creative city developed by the CCI (QUT) while also being nested within the extant creative city literature.

According to the brief given to the CCI by the BJSS, the scope of this project is as follows:

1. to review the burgeoning suite of international city indexes and indicators to assess their consequence and applicability to the creative cities index;
2. to integrate the most contemporary conceptions of the creative city into the index and indicators;
3. to compile a suite of indicators to compose the creative cities index;
4. to report on data sources for such indicators and possible contingencies;
5. to formulate the methodology to be used, and demonstrate the index construction in a preliminary analysis of at 2 major cities in 3 countries outside China (Australia, UK and Germany);

The BJSS will perform data collection work and compile the CCI Creative City index for Beijing and other cities inside China, for comparison, if so desired. For cities outside China, the CCI-CCI will be developed by the CCI.

1. Why a City Index Matters

> *"So the creative industries are important because they are clustered at the point of attraction for a billion or more young people around the world, and are the generative edge of urban, economic and human growth alike. They're among the drivers of demographic, economic and political change. They start from the individual talent of the creative artist and the individual desire and aspiration of the audience. These are the raw materials for innovation, change and emergent culture, scaled up to form new industries and coordinated into global markets based on social networks."*
>
> John Hartley (2009), p. 208

1.1 A Great City and a Great Index

What makes a great city? This is the question that the construction of world city or global city indexes has sought to answer. Interestingly, this concern has been a very recent development, mostly of the past decade, broadly coinciding with the rise of globalisation, the emergence of rapidly growing and changing emerging economy cities, such as Shanghai, Beijing, Hong Kong, Tokyo, Mumbai, etc., that are increasingly in direct competition with 'old' global cities like New York, London, Paris, etc., and coupled with vast improvements in information collection and classification standardisation.

Great Cities 1 – Power

It was not so long ago that the answer to what makes a great city was a simple arithmetic of:

Population × Wealth + Empire = Power

New York, London and Paris were **big trading cities, capitals of empire, and rich**: that made them powerful global cities without much further consideration of the specific causal components. There were certainly bigger cities (Mexico City or Jakarta, for example), but they were poorer, and thus plainly not global cities in the modern sense. Earlier European power-cities like Florence, Venice, Genoa, Lisbon, Amsterdam and Vienna would successively have figured on the list; as would capitals of non-Western empires, such as Istanbul. Going back further we would include Rome, Constantinople, Alexandria and Athens; and further still, Damascus, Byblos, Luoyang, Xi'an or Varanasi/Benares.[4] All of these cities were great according to our arithmetic model. Others, equally great in their day, have been lost to history (Thebes, Babylon, Ur, Hattusa, Angkor, Karakorum), or have declined to local significance (e.g. 11th century Lübeck; see Harford 2011).

City historians Peter Hall (1998) and Joel Kotkin (2005) provide scholarly overviews of the historical approach to city research. For more detailed statistical treatment, the work of Michael Batty (2006) on city scaling laws uses data on global city populations over the past 3000 years to trace these changes. There is no shortage of thoroughly researched long-run accounts of the rise and fall of great cities. For the most part they emphasise a simple political-economic arithmetic of a locus of power combined with fertile plains and effective institutions. Great cities were capital cities; places where power resided.

By the Middle Ages, cities became places where commerce resided too, as power began to shift to the secular world. Much of this story is associated with the rise of the West (Ferguson 2011), the invention of science, technology, democracy, media and, most important, the institutions of trade and commerce. Here global cities began to emerge about trading ports and network hubs (e.g. the northern European Hanseatic League), not about castles and palaces. Thus the world began to urbanise as people came to cities for reasons of enterprise, not for alms (or arms) or rents.[5] Cities became

[4] And see: http://en.wikipedia.org/wiki/List_of_cities_by_time_of_continuous_habitation.
[5] To this day, cities may still be plausibly divided by this distinction (patronage vs. entrepreneurship), a distinction that as yet has not been measured.

concentrations of people who choose to move there, away from rural domains, in pursuit of a better life to be made by themselves and with the others they might meet there, including potential employers and partners.[6]

Great Cities 2 – Enterprise

A somewhat different line has also developed through the work of urban theorists such as Jane Jacobs (1969) and more recently by Richard Florida (2002; 2005) and Elizabeth Currid (2007). This approach focuses on the adaptive functionality and emergent liveability of cities, emphasising in essence that great cities are grown, not planned. By drawing on the economics of self-organisation, Jacobs shows how – contrary to their purpose – planning laws and great plans often stymie the development of cities, by suffocating the development of local neighbourhoods. Florida and Currid show how the development of a city depends upon who moves there and why, emphasising the mobility dynamics of cities.

This dynamic institutional line has also been explored recently by economists Paul Romer (1990) and Ed Glaeser (2010),[7] who also theorise great cities as the result of great institutions, not of great plans, as well as examining the link between cities and the skills they harbour and express. This sort of work, like Florida's model, expresses the new economics of cities as emergent products or **crucibles of new ideas and attractors** for highly mobile smart and enterprising people (entrepreneurship and human capital, in the jargon). They also emphasise the locus of cities as sites of immigration by choice, in the sense that what makes a great city is that the most capable and aspiring people want to live there. This signals that (globally) **mobile human capital**, rather than given natural resources or accumulated physical capital, is the touchstone of what makes a great city.

In this view, cities are complexes of people, and the more entrepreneurial and capable those people are, the greater the city will be. Furthermore, because of feedback effects

[6] The great fairs in Medieval Europe, of which St. Bartholomew's in London (1133-1855) is one of the best-known, were *crucibles of commerce*. They were used by servants to find new masters for the ensuing year, and were also used for the sale of slaves, i.e. *service and labour were exchanged as well as goods*. See e.g. Walford (1883), pp. 10, 179.

[7] For Paul Romer, see also: www.chartercities.org. On Edward Glaeser's work see www.economics.harvard.edu/faculty/glaeser/papers_glaeser.

that accrue to the concentration and proximity of such idea-carriers and generators (Romer 1990, Krugman 1994), city greatness exhibits **non-linear dynamics**.

Great Cities Now – Great Attractors

Crucially, this introduces the importance of great cities as **zones of attraction**. In the older definition, a great city was so because it was powerful and rich; it was the centre (indeed the storehouse) of past greatness. In the new definition, however, a great city is so because those that seek to become rich choose to move there. It is great because of the **present and future potential** it offers, not because of its past accumulations. In this emergent dynamic conception, a great city is something that can be triggered and can shift in relatively short order as a function of the inflow of smart new people.

This shift in focus from a romantic and mostly static view of great cities as a *capital consequence* of great empires, towards the modern globalised and entirely dynamic view of great cities as *zones of attraction*, shifts the analysis of city greatness. In the older model, there was no serious discussion of what makes a city great because the answer was contained in the question of what makes an empire or monarch great. City greatness was an accidental consequence of being the capital of such an empire. There was nothing to understand about city greatness per se, and much to misunderstand.

But as empires have crumbled since World War I, and nation-states have weakened as economic entities since globalisation, cities have re-emerged (as they were prior to the 1700s) as the **crucibles of commerce** and the proper focus of development and growth economics.

This is evidenced by the fact that the leading growth and development economists at the most elite universities have focused on the *causes of city growth*, to a first approximation, as the outcome of the *choices of a mobile elite of smart global citizens*. Great cities, in this view, are made of interesting and capable people. To make a great city, the issue then becomes how to attract such great people.

New scholars of cities, following the line of evolutionary and institutional economics, have re-emphasised the role of *good rules or institutions* (economic efficacy). The new model of cities is dominated by **entrepreneurship and attractiveness to citizens**. Cities

are great because of their perceived **capabilities and potentials**. The question, then, is what attracts capable citizens and potential immigrants? The purpose of index construction is to answer that question.

Great Cities Need a Great Index

Recent scholarly endeavour to answer the question has sought to follow these new theoretical lines and has turned to the construction of multi-component statistical indexes, each based around a suite of specific indicators over multiple dimensions. Such indicators seek to decompose and identity the factors that attract interesting migrants and citizens.

This has seen something of a growth industry in city analytics during the past 10 years or so. Richard Florida, for example, has famously emphasised *talent, technology and tolerance* as the secret ingredients of the mix. Others such as John Kasarda (2011) emphasise the role of growth focused transport networks, or specifically what he calls the '*aerotropolis*'. Despite their differing attention to the role of the 'creative class' and that of the airport, these approaches emphasise the same thing, namely the city as an attractor, or – it follows – as a *competitor* with other cities. In Kasarda's world, it is not companies that compete, but supply chains. In Florida's world, it is not people who compete, but cities. This should be well familiar to students of strategic management theorist Michael Porter, who makes an integrated point about the development of localised *competitive advantage*. The very definition of a (successful) cluster is such a nexus. Economists such as Alfred Marshall had already recognised and described this phenomenon over 100 years ago with the notion of 'external economies' which then became the basis for work on *industrial districts and clusters*.

But now we need to try and disentangle this complex, to understand what specific aspects contribute to this contemporary and ongoing attractiveness. And that is the point of the various global city indexes that have recently emerged. Once we are beyond the notion that great cities are the children of great empires, we enter a world where great cities are the 'adults' of great institutions. But what are those institutions? That is what we seek to discover. The purpose of the extant and new city index constructions is to unpack this complex.

The value of these indexes is thereby two-fold. On the one hand they *quantify and standardise* measures of variation. On the other hand they decompose it into *factors* of important variation. We are now concerned to seek to understand the specific *sources* of variation and differentiation that make a great city great. This is no longer a default presumption by capital position in empire.

Cities now compete. And like the competition between corporations in highly contestable markets, these dimensions and magnitudes of differences in cities are issues of significant competitive advantage. We are now in a world where rank indexes of cites matter not as politically charged issues of mostly romantic issues of imperial pride, but as practical issues of city strategy. These indexes are less celebratory laurels of past glory, and more dashboard measures of current performance. These new indexes matter; **a good index is a competitive advantage** to any growing and competitive city.

1.2 Global City Theory and Analysis

There is a substantial body of literature on the rise of global cities. This divides between the work of *historians*, such as Peter Hall and Joel Kotkin, urban *sociologists* such as Saskia Sassen, Carl Abbot and Manuel Castells, and urban social *geographers* such as Paul Knox and Peter Taylor, among many others.[8] While it is difficult to précis such a compendium of research both over different disciplines and with respect to different questions, a summary can be stated.

First, **cities matter**. They are the primary locus for the development of human civilisation and economic systems. This point is unambiguous in the work of city historians, and it carries over to the 'new economic geography' and 'endogenous growth theory', associated with the work of economists Paul Krugman and Paul Romer, for example. Cities are *crucibles of economic and socio-political development*. The key point here is that this statement thereby excludes or relegates other such levels of organisation, such as villages, towns, nation states, international communities, or even empires, as being relatively less significant. The explanation is the *economics of ideas*. Cities are places where people and ideas mix most effectively.

[8] Scottish sociologist and town planner Patrick Geddes, for example, arguably developed this field in Geddes (1911).

Second, **cities rise and fall**. The rankings of great (world) cities change through time. These changes in part reflect the vicissitudes of other exogenous factors impinging on regions, nation states, empires and the like, but are also due to the endogenous success of particular city institutions. There is mobility in the rank of cities through time, and achieving greatness is no guarantee of maintaining that through time. Again, this is a robust finding from city historians (see Batty 2006, *op. cit.*).

Third, **cities compete**. They compete for 'factors of production' which means, in effect, people and capital. For as long as factors of production have been mobile, cities have competed. Their success or failure in competition for these globally mobile factors is the major explanation of the rise and fall of cities.

This insight has provoked two types of response among scholars. One side, represented mostly by historians and economists, sees competition as a natural and evolutionary process and emphasises its gains and benefits. It implicitly values the **mobility** of factors (including people) as a free choice that results in the aggregate improvement of an ever more globalised society. It tends to look for the successful **strategies and institutions** that have enabled some cities to compete successfully. The other side, represented mostly by urban sociologists and geographers, sees the problems and troubles caused by mobility-induced competition (globalisation as a problem). It emphasises **dislocation, social problems, destruction of community** and the like. It looks to city-level government intervention, in particular planning-based solutions, to redress these problems. There are of course many exceptions to this binary opposition, for example the anti-planning urban sociologist Jane Jacobs. Partial resolutions are achieved, for example by sociologists turned strategists such as Charles Landry and Richard Florida. But there remains a significant difference in analysis and policy thrust between those who view competition between cities positively, as an *opportunity with strategic solutions*, and those who view it negatively, as a *problem with intervention solutions*.

Our report finds greater congruence with the historians' and economists' perspective than with that of the sociologists and geographers. We seek to accept all three propositions: that cities matter to human and economic development; that cities rise and fall; and that this dynamic is a consequence of the process of global competition for

scarce, valuable and mobile resources, the most important of which are enterprising and creative people.

We recognise that this dynamic evolutionary process will create disruptions and transition problems; including 'creative destruction' of city infrastructure, legacy cultural forms and their attendant occupations, and that there will be scope for management and even planning in this process. But we do not conclude from this that the *top-down management of downside dynamics* (which we call a *'welfare' model of cultural policy*) should be the main focus for a presently successful or aspiring global city. If the watchword is competition, which plays out globally, then *an entrepreneurial and strategic response is required*.

When framed in this way, **our underlying 'model' is one of dynamic flows**. A global city is not understood with respect to exogenous factors such as a given political power base, or industrial base, or even cultural base, but rather with respect to the endogenous question of what makes the people and other factors who reside there *more productive and effective* than they would be elsewhere (i.e. why do existing 'customers' stay?) and why do people and other factors who are not there want to migrate there (i.e. why do new 'customers' arrive?). This model then focuses on the **creative productivity benefit** that a city offers, and by implication its supporting or enabling physical, social, legal, institutional and cultural infrastructure, both tangible and intangible.

What *competitive advantage* (in the language of Michael Porter) does a city's creative potential generate; and how can that advantage be *sustained*?[9] 'Creative city' writers like Charles Landry and Richard Florida (et al.) stress the strategic need to develop attractors for mobile factors, in competition with cities worldwide, and we agree with that overarching proposition. Our view does however differ from theirs in the detail of what composes the creative potential advantage. For instance, we think **youth culture, experimental space and novelty-bundling occasions** (festivals, fairs, markets) where people can mix indiscriminately, and in stylistic competition, have been under-emphasised; and that architecture and generic talent have been over-emphasised. We are also suspicious of the *'real-estate' model of cultural policy*, a 'build-it-and-they-

[9] In Charles Leadbeater's terms, a sustainable competitive advantage in the knowledge economy requires creativity that is 'hard to imitate,' producing IP that is 'easy to replicate': see Leadbeater & Oakley (2001), p. 19.

will-come' approach, *a la* New Songdo City in Korea, for example. We favour bottom-up approaches where people figure out new ways to harness latent existing potentials via re-invention, utilising the sunk-capital of the past (including relics of an imperial or political past) in innovative ways.

But we must face the problem that 'attractive factors' and 'creative potential for competitive advantage' are difficult to identity and define. This is why it is necessary to construct a suite of indicators to capture activities that may seem insignificant; spaces for youth culture, for example, which on the face of it are less impressive than great airports or industrial headquarters. Appropriate policies are difficult to implement, because simply committing large amounts of public resources may not be sufficient. It may not even be necessary. Grand plans often fail. As in all competition, adaptation, experimentation and learning are the key process ingredients. Rather than recommending a shopping-list of capital infrastructure investments, the approach we develop is focused on identifying such indicators of **experimentation, learning and innovation**. This is especially necessary in the challenge of creating a creative world city.

Creative cities of the past did not arise from pre-constructed plans, but **emerged as self-organised solutions to problems of complexity**, as Jane Jacobs (2000) put it – from an experimental and often stumbling process of adaptation and learning, many of whose lessons still remain latent or 'tacit' rather than explicit knowledge. We seek to identify what factors – institutional, cultural, social and physical – make for successful outcomes in inter-city competition for that most valuable global resource of the enterprising creative immigrant, or re-inspired native, who will contribute to building a great city and by their presence make it an even more attractive place for others.

2. Critical Review of the City Index Industry

"It is this micro-diversity in behaviour which is the basis for a competitive process, for structural change and for economic growth. Capitalism is restless because of its unlimited capacity to generate new knowledge and new behaviours and it is this propensity for variation which makes it so dynamic, such that economies may be completely transformed in structure over relatively short periods of historical time. Every advance in knowledge creates the conditions for further advances... But variety and change in variety alone is only part of the picture. Equally important is the coordination of variety by market institutions to determine how differences in behaviour are resolved into evolving patterns of economic activity."

Stan Metcalfe (2000)

2.1 Two Types of Index

The many existing city indexes can be grouped into two classes (see Table 2 below):

1. **Creative Stocks: creativity and culture-based** indexes;
2. **Creative Flows**: indexes that focus more broadly **on world status, global integration, and ICTs** (information and communication technology).

The first class of index, exemplified by the work of Richard Florida and his colleagues, is based on the premise that a 'creative class' of migrants is drawn to cities by cultural attractors and by societies that value diversity, openness and tolerance. These indexes also strive to measure the vibrancy of the creative sectors in terms of output, employment, participation and talent. This is a *stocks* approach, even though the point is to attract mobile **inflowing stocks** of talent and intellectual capital.

Table 2: Broad Classification of City Indexes

City Index Classes		
Creativity and Culture Stocks	**Global Cities, Networks and Tech/ ICT Flows**	**Other Approaches**
Florida's Creative Cities Index	The Global Power Cities Index	Oslo Manual
The Euro- Creativity Index	The Global Cities Index	Creativity Grid
Czech Creativity Index	Global City Indicators Facility	Landry's Index
Sharpie's Creativity Index	Fundamental and Flow Index	
Creative Communities Index	The Globalization and World Cities Index	
The Creative Vitality Index	The Shift Index	
European Creativity Index	World Knowledge Competitive Index	
Hong Kong Creativity Index	Information Society Index	
Cultural Life Index		
Composite Index of the Creative Economy		
Design, Creativity and Innovation Scoreboard		

Indexes in the second class, exemplified by the Global Power Cities Index, tend to include comparable (though less detailed) 'creative' indicators as a subset, while expanding to cover a wider pool of city attractors, including business activity, liveability, the environment, transportation and accessibility, and technology. This wider scope tends to shift the focal point from culture and creativity towards city infrastructure and basic services, innovation and technology performance, and

international exchange and network formation. This is a *flows* approach since it measures a city by the magnitude of **connections that flow between cities**.

In the following review we have divided the extant city indexes into these two classes: creative stocks and global flows. We also include a further section discussing other prominent approaches from the literature on world creative cities. Tables 3 and 4 (below) presents a checklist of the dimensions and indicators covered by the various city indexes included in our review. The checklist consists of 16 general themes from which the index dimensions are drawn:

Table 3: 16 General Themes of City Index Dimensions

1. Culture, Recreation & Tourism
2. Creative Output & Employment
3. Cultural Capital & Participation
4. Venues, Resources & Facilities
5. Liveability & Amenities
6. Transportation & Accessibility
7. Globalisation, Networks & Exchange
8. Openness, Tolerance & Diversity
9. Human Capital, Talent & Education
10. Social Capital, Engagement & Support
11. Government & Regulations
12. Business Activity & Economy
13. Entrepreneurship
14. Innovation & R&D
15. Technology & ICT
16. Environment & Ecology

Table 4: Checklist of City Index Dimensions and Indicators: Stocks

CITY INDEX CHECKLIST	Culture, Recreation, Tourism	Creative Output, Employment	Cultural Capital, Participation	Venues, Resources, Facilities	Liveability, Amenities	Transport, Accessibility	Globalization, Networks, Exchange	Openness, Tolerance, Diversity	Human Capital, Talent, Education	Social Capital, Engagement, Support	Government, Regulation	Business Activity, Economy	Entrepreneurship	Innovation, R&D	Technology, ICT	Environment, Ecology
CREATIVITY AND CULTURE																
Florida's Creative Cities Index	☐	☐	☐	☐	☐	☐	☐	✓	✓	☐	☐	☐	☐	✓	☐	☐
The Euro-Creativity Index	☐	☐	☐	☐	☐	☐	☐	✓	✓	☐	☐	☐	☐	✓	☐	☐
Czech Creativity Index	☐	☐	☐	☐	☐	☐	☐	✓	✓	☐	☐	☐	☐	✓	☐	☐
Sharpie's Creativity Index	✓	✓	✓	☐	✓	☐	☐	✓	✓	☐	✓	☐	☐	☐	✓	✓
Creative Communities Index	✓	✓	✓	✓	☐	☐	☐	☐	✓	✓	✓	☐	☐	☐	✓	☐
The Creative Vitality Index	☐	✓	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
European Creativity Index	✓	✓	✓	☐	☐	☐	☐	✓	✓	✓	✓	☐	☐	☐	✓	☐
Hong Kong Creativity Index	✓	✓	✓	✓	☐	☐	☐	✓	✓	✓	✓	☐	✓	✓	✓	☐
Cultural Life Index	✓	✓	✓	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	✓	☐
Composite Index of the Creative Economy	☐	☐	☐	☐	☐	☐	☐	✓	✓	☐	☐	☐	✓	✓	✓	☐
Design, Creativity and Innovation Scoreboard	☐	☐	✓	☐	☐	☐	☐	✓	✓	☐	☐	☐	☐	✓	☐	☐

Table 5: Checklist of City Index Dimensions and Indicators: Flows

CITY INDEX CHECKLIST	Culture, Recreation, Tourism	Creative Output, Employment	Cultural Capital, Participation	Venues, Resources, Facilities	Liveability, Amenities	Transport, Accessibility	Globalization, Networks, Exchange	Openness, Tolerance, Diversity	Human Capital, Talent, Education	Social Capital, Engagement, Support	Government, Regulation	Business Activity, Economy	Entrepreneurship	Innovation, R&D	Technology, ICT	Environment, Ecology
GLOBAL CITIES, NETWORKS AND TECH/ICT																
The Global Power Cities Index	✓	☐	☐	☐	✓	✓	☐	☐	☐	☐	☐	✓	☐	✓	☐	✓
The Global Cities Index	✓	☐	☐	✓	☐	✓	✓	✓	✓	☐	✓	✓	☐	☐	✓	☐
Global City Indicators Facility	✓	✓	✓	☐	✓	✓	☐	✓	✓	✓	✓	✓	☐	✓	✓	✓
Fundamental and Flow Index	✓	☐	☐	☐	✓	✓	✓	✓	✓	☐	☐	☐	✓	✓	✓	☐
The Globalization and World Cities Index	☐	✓	☐	☐	☐	☐	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐
The Shift Index	☐	☐	☐	☐	☐	☐	✓	✓	✓	☐	✓	✓	✓	☐	✓	☐
World Knowledge Competitive Index	☐	☐	☐	☐	☐	☐	☐	☐	✓	☐	☐	✓	✓	✓	✓	☐
Information Society Index	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	✓	☐
OTHER APPROACHES																
Oslo Manual	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	✓	✓	☐
Creativity Grid	✓	☐	☐	✓	✓	☐	✓	✓	✓	☐	☐	☐	✓	☐	✓	☐
Landry's Index	☐	☐	☐	☐	✓	☐	✓	✓	✓	☐	✓	☐	✓	☐	☐	☐

Based on our assessment of these 16 dimensions, which we take as key analytic points of decomposition:

- Chapter 2.2 discusses the eleven leading culture and creativity indexes;
- Chapter 2.3 discusses the eight leading global cities and networks indexes;
- Chapter 2.4 discusses three additional indexes that are more general in respect of these two classes of global city index.

We seek to identify the strengths and weaknesses of the respective indexes, and present this discussion in order to outline the parts of the extant indexes that we will seek to incorporate into our CCI Creative City Index, as well as highlighting gaps in the extant measures that we will seek to fill.

2.2 Creativity and Culture-based Indexes

Florida's Creative Cities Index

For Richard Florida, cities must focus on capturing the imagination of talented individuals rather than concentrating solely on building infrastructure or industrial locations.[10] But even so, the rise of the creative city depends not only on successfully attracting the creative class, but also on how well this is translated into creative economic outcomes such as new ideas, new high-tech businesses and regional growth[11].

Florida's framework consists of the 3 Ts – *talent, technology and tolerance*. He contends that cities with greater numbers of 'artists, musicians, professors and scientists' (Florida, 2002: 12), high-tech workers, foreigners, gay people and so-called 'high bohemians' will have higher levels of economic development.

Given the implied focus on social outsiders, this was a radical suggestion when first proposed. But Florida's index has been one of the most successful and widely discussed measures of creative cities, precisely because it combined a basic truth (that creativity does indeed often come from outsiders) and also a relatively cost-effective solution

[10] Florida's private consulting firm, The Creative Class Group: www.creativeclass.com; see Florida (2002).
[11] Florida has recently used this framework to assess the creative economy in China; see Martin Prosperity Institute (2011).

(Florida's consultancy fees aside): namely loose zoning laws, better universities or technology parks, and relatively low-cost urban leisure amenities. All of these factors were within the reach of city councillors, partly explaining the positive reception and significant uptake Florida's ideas have received.

The definition of creativity used in Florida's index is relatively broad, extending well beyond the so-called creative industries (e.g. arts, culture and entertainment). A large number of indicators selected for his index assess science-based innovation (e.g. patents, R&D expenditure, number of scientists). For this reason it may understate the role of culture and creativity as usually understood, although this of course depends on the scope that we use in defining our image of a global creative city. Nonetheless, indicators from Florida's 3T model will certainly come under consideration in our index. As he says: 'Creativity … is now the *decisive* source of competitive advantage' (2002: 5).

Table 6: Dimensions and Indicators of Florida's Creative Cities Index

Florida's Creative Cities Index
TALENT
Human capital (e.g. number of university graduates, ranking of local universities, concentration of people with Bachelor's degrees)
Creative class (e.g. percentage of workforce defined as the 'creative class', 'creative occupations' ISCO-88)
Researchers (number of people working in R&D-intensive jobs; creative core)
TECHNOLOGY
Innovation (e.g. number of registered patents, patents per capita)
High-tech innovation (e.g. number of registered high-tech patents, high-tech patents per capita)
High-tech industry (e.g. Milken Institute's Tech Pole Index, number of technology-heavy companies, share of workforce employed in high-tech industry)
TOLERANCE
Foreign-borns (e.g. percentage of foreign-born population, size of foreign student population, number of international schools)
Diversity Index (e.g. fragmentation index based on ethnic background of foreign born population 1 – $\sum$ pop. share^2)
Gay Index (e.g. fraction of gay people living in a region divided by the fraction of the total (US) population living in the area, tolerance surveys)
Bohemian Index (e.g. concentration of workforce engaged in artistic or avant-garde – experimental – activities)

The Florida 3T model has been applied many times, and it has been tailored in other studies to suit the specificities of different regions (e.g. Europe rather than North America) (Florida & Tinagli 2004). Extensions have also been made to the 3 Ts to include a fourth 'T' – *territory*, e.g. territorial and communal amenities such as universities, water, excellent transportation, particularly rail and airports, and affordable housing, proximity to jobs, proximity to 'nature', historic buildings in the area (i.e. high quotient of past-culture sites) (Acs & Zegyesi (2009); Marlet & van Woerkens (2004).

Sharpie's Creativity Index

Celebrity pen manufacturer *Sharpie* and consumer think tank *The Future Laboratory* developed Sharpie's Creativity Index (Future Laboratory 2007). It lists the UK's 20 most creative towns and cities as determined by data provided by 60 national and local organisations. This index is significant and useful for our purposes because it develops measures of creative subcultures and local environments, particularly of creative consumption.

The index uses the following quantitative and qualitative criteria:

- **Creative output**, including numbers of residents employed in the creative industries, numbers of self-employed residents, and awards for creativity;
- **Creative funding**, measuring financial investment in creativity;
- Sexual, racial and cultural **diversity;**
- The existence of thriving **subcultures;**
- **Sustainability**, an emerging cornerstone of modern creativity;
- **Cost of living**, since the creative industries tend to be low-paid;
- **Creative consumption** in terms of festivals, fairs, museums and galleries;
- **Education and technology**.

Sharpie's Creativity Index is more narrowly focused on cultural rather than scientific or innovative creativity. It includes many useful candidate indicators for our study.

Creative Communities Index

The *Silicon Valley Creative Communities Index* was created to assess the region's capacity for sustaining technological and business innovation in terms of its creativity and social connectedness. It is a collaborative effort of the John S. and James L. Knight Foundation (a leading community-indicators consultant throughout the U.S.), Americans for the Arts, the City of San Jose□ Office of Cultural Affairs (see Cultural Initiatives Silicon Valley 2003). This project views creativity as key to improving how people live together as a community, collaborate and solve problems associated with social cohesion, urban form, transportation, educational opportunity, and environmental stewardship. It is useful it suggests measures of community attractiveness and their intersection with creativity. It is also useful in that it is very 'micro', based on in-depth surveys.

The indicators are grouped into four categories:[12]

1. **Outcomes**: healthy cultural life, broad-based creativity, social connectedness among diverse people and contribution to the quality of life in Silicon Valley;
2. **Participation**: residents' participation in arts and cultural activities, including the extent to which diverse people participate together;
3. **Assets**: the mix of cultural assets present in the community, including talent in the creative sector (non-profit, public and private), venues and facilities, and the aesthetic quality of our environment;
4. **Levers**: building cultural assets and encouraging interaction with them through arts education, leadership, investment, and policies.

The index is constructed mainly through personal interviews with residents in order to gain an understanding of what they think about arts and culture in the region, and as a result many of the indicators will not be easily transferable to our study, nevertheless, they do provide useful guidelines.

Creative Vitality Index

Participation is a major component in the Creative Vitality Index as well. This one measures the health of a creative economy relative to a national benchmark according

[12] See Appendix 1 for full list of index components.

to **arts-related participation and employment** (see Washington State Arts Commission, 2010).

The creative economy as defined in this index includes both for-profit and non-profit arts-related enterprises. One component measures seven indicators of community participation in the arts (i.e., per capita museum and art gallery revenue from ticket and product sales) while the other measures arts-related employment in more than 30 professional categories (e.g., actors, graphic designers, television producers, art teachers). It is reasoned that the balance of the cause-and-effect relationship between participation levels and jobs lies with participation, and as a result the components are weighted 60% towards participation and 40% towards employment.

These citizen participatory indicators are of clear importance to any creative city index, and will therefore inform consideration for our model.

European Creativity Index

The European Creativity Index was created by the creative industries consultancy group KEA European Affairs (2009) as part of a study on the contribution of culture to creativity, conducted for the European Commission in 2008/09. Focusing on the cultural dimensions of creativity, this index considers a number of factors, including:

- Education in **art schools**
- Cultural **employment**
- Cultural **offering**
- Cultural **participation**
- **Technology** penetration
- **Regulatory and financial support** to creation
- Economic contribution of cultural industries

These indicators are grouped in five pillars of creativity, namely:

1. **Human** capital;
2. **Technology**;
3. The **institutional** environment;
4. The **social** environment;
5. Openness and **diversity**.

As such this index represents a further broadening of the base of creativity indexes. According to the index framework, the five pillars of creativity combine to influence creative outcomes. In total the paper suggests 32 indicators (including data sources) related to the five pillars as well as the outcomes of creativity.

Hong Kong Creativity Index

The Hong Kong Creativity Index was produced by the Centre for Cultural Policy Research, University of Hong Kong, having been commissioned by the Hong Kong Special Administrative Region Government (Home Affairs Bureau HKSARG, 2004).

The Index comprises five elements:

1. **Creativity outcomes**;
2. **Structural** capital;
3. **Human** capital;
4. **Social** capital;
5. **Cultural** capital.

This model stems from Florida's 3 Ts – technology, talent and tolerance – but broadens out from economic and technological outputs of creativity to incorporate ideas from the Silicon Valley Creativity Community Index, such as cultural infrastructure, social connectedness, cultural participation and cultural policies. It also covers other creativity and competitiveness elements taken from the World Values Survey of Inglehart and the Global competitiveness report of Michael Porter (Inglehart & Baker 2000).

The index framework builds on '5 Cs':

1. *Outcomes of creativity* (importance of creative industries);
2. *Institutional/structural capital* parameters conducive to creativity (intellectual property, fiscal incentives, technology infrastructure);
3. *Human capital* (notably educational qualifications);
4. *Social capital* conducive to creativity (including level of tolerance and diversity);
5. *Cultural capital* as participation and cultural offering (museums, venues) as a factor to simulate creativity.

Essentially, the four forms of capital (structural/institutional, human, social and cultural) are seen as the determinants of growth of creativity, the accumulated effects of which are manifest in creative outcomes or outputs. Again, while this index may be somewhat prone to undermining the impact that cultural factors have on creativity, it provides useful candidate indicators for our study.

Cultural Life Index

The Report on Cultural Life by the Finnish Ministry of Education and Culture is a compilation of indicators of cultural life (62 indicators) (Picard, Gronlund & Toivonen 2003). It is broken down into three sub-indexes:

1. Cultural **availability**;
2. Cultural **participation**;
3. Cultural **production**.

These can then be combined to compute the Cultural Life Index. It is assumed that a rich cultural environment benefits creativity and that social life triggered by cultural activities supports the creative economy. The index is not actually calculated, nor does it go into any detail of how it is to be calculated. It is a simply a suggestion of possible indicators that would go into such an index. In fact, it proposes a useful, rich and detailed source of potential cultural-based indicators that our indicator suite draws upon.

Composite Index of the Creative Economy

The Composite Index of the Creative Economy takes a wider definition of the creative economy, and can be seen as a bridge of sorts between 'Florida-style' creativity indexes and broader global city indexes (Bower, Moesen & Sleuwaegen 2008). This study attempts to benchmark creative capacity via achievement in three dimensions – **innovation, entrepreneurship and openness** – thus including hallmarks of Florida's framework while branching into measures of **business activity** (e.g. newly established companies, venture capital) and **ICT infrastructure** (Internet access).

This index is also noteworthy for the methodological approach it takes – to determine the weight each sub-dimension should contribute to the total value of the index, the

authors employ endogenous weighting.[13] This allows each entity to have its own unique set of 'best' weights, in which good performance in a particular dimension can be interpreted as revealing that a region sets a higher priority on that dimension. This is a method that we seek to replicate.

Design, Creativity and Innovation Scoreboard

This 'scoreboard approach' uses a set of indicators to capture different dimensions of creativity and design, based on the European Innovation Scoreboard (Hollanders & van Cruysen 2009). Produced by UNU-MERIT (Maastricht Economic and Social Research and Training Centre on Innovation and Technology, Maastricht University), the Scoreboard provides an annual assessment of the innovation performance of EU Member States.

The 35 indicators are classified in 7 different dimensions. Of these, 3 capture the creative climate and 4 capture creativity and design. This assessment is based on a wide range of indicators covering structural conditions, knowledge creation, and innovative efforts by firms, and outputs in terms of new products, services and intellectual property. Like the Composite Index, the Design, Creativity and Innovation Scoreboard incorporates 'Floridian' measures of technology, tolerance and talent, but is novel in that it is skewed towards design activities. This focus on design is a further aspect we seek to develop in our indicator suite.

2.3 Indexes of Global Cities, Networks and Technology/ICT

The following sets of index indicator proposals are less focused on creativity, as above, but more on the information economy, enterprise and trade, and technology aspects of global cities. In many cases these align with the above index measures, but the main difference is that where the above indexes ostensibly focus on the cultural life and creative potential of a city, these indexes unabashedly focus on its economic, entrepreneurial, technology and business environment, with a culture as an aspect of

[13] This is inspired by data envelopment analysis (DEA). Data values are normalised to lie between zero and unity so that each score indicates the 'distance' that a given region is from the 'best practice' maximum value of unity. Similarly, the difference in the score value between any two regions indicates that distance that one region is from another region.

residency, not so much a factor of production. Our design on a good solution for a creative cities index is to take the best of the above suites, with some further inclusions and adaptations, and then to incorporate them into an edited version of the best of the more general suites below. Of these, we suggest that the Global Power Cities Index provides the best platform for development.

The Global Power Cities Index

Perhaps the most comprehensive and arguably the pre-eminent index of global cities has been created by The Institute for Urban Strategies at *The Mori Memorial Foundation* in Tokyo, Japan, which conducted a comprehensive study of global cities in 2010 (Institute for Urban Studies 2010). This has resulted in the development of the Global Power Cities Index, a ranking based on 6 overall categories with 69 indicators:

1. Economy;
2. Research and Development;
3. Cultural Interaction;
4. Liveability;
5. Ecology and Natural Environment;
6. Accessibility.

Each category is separated into a number of indicator groups and then the indicators themselves. The authors list the indicator groups but do not disclose all of the indicators (although some examples have been gleaned from various reports, see Appendix A12). This is an excellent index that, while proprietary, provides important guidance to the development of a comprehensive creative cities index.

Table 7: Categories and Indicator Groups of the Global Power Cities Index

The Global Power Cities Index
ECONOMY
Market attractiveness
Economic vitality
Business environment
Regulations and risks
R&D
Research background
Readiness for accepting and supporting researchers
Research achievement
CULTURE
Trendsetting potential
Accommodation environment
Resources for attracting visitors
Shopping and dining
Volume of interaction
LIVEABILITY
Working environment
Cost of living
Security and safety
Life support functions
ECOLOGY AND NATURAL ENVIRONMENT
Ecology
Pollution degree
Natural environment
ACCESSABILITY
Infrastructure of international transportation
Infrastructure of inner-city transportation

This index also ranks the top ten world cities in subjective categories, from the point of view of various actors such as 'manager', 'researcher', 'artist', 'visitor' and 'resident'. A profile of each actor is described and their demands on the city for performing their role are defined. Each actor selects a suitable bundle of indicators, which are aggregated to reflect the actor-specific rankings.

We strongly recommend that this method be adopted as part of the CCI Creative City Index, although it imposes some further costs and complexities in index construction. The benefit is that it allows disaggregation of the 'attractiveness' of a creative city by cohort. Targeted marketing endeavours at different demographic cohorts will benefit from such disaggregated analysis, suggesting both improvements in efficiency and effectiveness in city promotion.

Additionally, the dependency relations among the 35 cities are analysed and visualised as a 'Global Circuit' on 'Airline Flows' and 'Global Corporation Networks' for financial and non-financial corporations. This provides further information about a city's integration into global networks.

This index does not focus on creativity, which is its main weakness, although many of the index dimensions and indicators may be applicable to our study. Indeed, we seek to investigate the **intersection between creative and global cities**. Moreover, the **actor-specific rankings** and **global circuit** approaches may prove to be instructive methodologies. Thus while the Global Power Cities Index is perhaps too broad-based to fit the scope of this study, it does provide helpful examples of a subset of potential indicators pertaining to globalism and suggests several promising methodological directions for development.

The Global Cities Index

The Global Cities Index It is the product of collaboration between the global politics and economics magazine *Foreign Policy*, management-consulting firm A.T. Kearney, and The Chicago Council on Global Affairs.[14] It ranks city metro areas according to 25 indicators across five dimensions:

[14] Published annually on the Foreign Policy website: www.foreignpolicy.com/articles/the_global_cities_index_2010

1. Business activity;
2. Human capital;
3. Information exchange;
4. Cultural experience;
5. Political engagement.

Again, this is a broad-based index, although one of the five index dimensions captures 'cultural experience'. It includes metrics ranging from the volume of goods passing through a city (business activity) and the percentage of residents with university degrees (human capital), to the number of international news bureaux (information exchange) and the number of foreign embassies (political engagement.

But its concept of 'cultural experience', in essence, refers to cultural *consumption* by residents, which is an indicator of what culture is there to experience rather than how much citizens participate in its creation. This is a common treatment of global city indicators, and one that we seek to improve upon in the CCI Creative City Index.

Overall, the information exchange and political engagement indicators are interesting insofar as they capture the extent of **international connectedness** that is requisite of a *global* city. These measures of global connectedness are important, although we note that in this case they confirm more to a 'past/power' than a 'present/enterprise' conceptualisation of city functions.

Global City Indicators Facility

The Global City Indicators Program established a set of city indicators with a globally standardised methodology that allows for international comparison of city performance and knowledge sharing. The Global City Indicators Facility website provides a database of such indicators to all member-cities for measuring and reporting their performance.[15] There are over 70 cities participating worldwide, including, for instance, Melbourne, Toronto, Mumbai and Dubai. The Global City Indicators Program is structured around 22 'themes' organised into two categories that measure a range of city services and quality of life factors (Table 8). City services includes services provided by city governments and

[15] www.cityindicators.org.

other entities whereas quality of life includes critical contributors to overall quality of life, but are not the direct responsibility of any local service provider.

Table 8: Global City Indicators Facility 'Themes'

City Services	Quality of Life
Education	Civic Engagement
Energy	Culture
Recreation	Economy
Fire Emergency	Environment
Response	Shelter
Governance	Social Equity
Health	Subjective
Social Services	Well-Being
Solid Waste	Technology And Innovation
Transportation	
Urban Planning	
Waste Water	
Water	

A suite of several indicators measures city performance. The Global City Indicators Facility does not aggregate these metrics into a city index; it simply provides a useful database of indicators for the task of constructing such an index. However, the measures that are counted in the Global Indicators Facility mostly relate to local government claims based on spending commitments, not outcomes, and thus must be treated appropriately. This approach is useful, however, to assist with the **calibration and cross-checking** of any proposed index, to reveal any significant disagreement or unusual results. Because of the **diversity of cities** participating across developed and developing nations, and under very different geographic and political circumstances, this is a useful database.

Fundamental and Flow Index

This study, conducted by the Fukuoka Benchmarking Consortium, compares 6 major Japanese cities with its own indicators of 'fundamental' and 'flow' factors for a creative

city index.[16] It is based on the 'Floridian' creative class hypothesis that cities scoring highly on the index successfully attract the creative class, leading to the development of a 'knowledge society'.

The index consists of five 'fundamental' factors:

1. Industrial infrastructure and human resources;
2. Research and tertiary education;
3. Convenience, culture and entertainment;
4. Living environment;
5. Exchange activities.

It adds five 'flow' factors:

1. Flows of people;
2. Flows of materials;
3. Flows money;
4. Information flows;
5. Flows across national boundaries.

The most interesting aspect of this index is the explicit focus on **flows and exchange** (global integration) and the implications for the growth of knowledge and the favourable evolution of the creative cities. The study finds that the primary factors for producing **a virtuous cycle** effect between development of fundamental and flow factors for the creative city are **universities, transportation networks, and the tourism industry.** Educational and research functions of universities are pivotal in developing industrial clusters, and efficient transportation infrastructures and the increase in flows are essential for the promotion of tourism industry. Further, analysis of population change by occupation (for the 6 Japan cities) supports this and is consistent with the creative class hypothesis.

While this index is limited to one nation, and only covers six cities, and hence is a weak basis for generalisation, its method of differentiating between **factors and flows**, and

[16] Conference presentation outlining the index available online: www.internationalregions.org/docs/InnovativeRegion_Nagase.pdf.

tracing these through **occupational dynamics**, suggests a useful model of **city evolution**.

The Globalisation and World Cities Index (GaWC)

Based in the Geography Department at Loughborough University, the Globalisation and World Cities (GaWC) Research Network is perhaps the foremost academic think tank on cities in globalisation.[17] GaWC focuses upon the external relations of world cities; that is, a city-centred world of flows rather than the more familiar state-centred world of boundaries.

The GaWC is a highly regarded index, in significant part because of the strength of academic input into it. In comparison, many and indeed most of the indexes discussed in this report are private sector or consultancy-derived indexes. The scholarly underpinning comes from experts in urban geography and sociology, giving it a claim to some rigour and robustness.

GaWC's explicit focus on **globalisation** is important, not only because international integration is a critical condition of world cities, but also because most city-index research hitherto has been confined to comparative analysis of *internal structures of individual cities*. Even measures of financial and human capital flows emanating from individual cities neglect the *relations between cities*. The GaWC approach goes some way to rectifying this.

It assesses cities in terms of their (share of some aggregate level of) advanced producer services using an *interlocking network model* (see GaWC Research Bulletin 23: Taylor 2001). Indirect measures of flows are derived to compute a city's network connectivity, which measures a city's integration into the world city network. This model could be applied to globalisation in various dimensions (e.g. economic, political, cultural or social) in terms of scale (i.e., gross level of services/production) and network (i.e., proportion of activities in each city).

[17] www.lboro.ac.uk/gawc/.

A particularly germane paper from GaWC considers an alternative dimension of world city network formation, driven by **transnational media corporations** rather than advanced producer services (Watson & Hoyler 2010). Through an empirical analysis of the office networks of media corporations, they measure the integration of global media cities into the world city network. They interpret these networks as tangible working connections between cities.[18]

The data consists of 525 cities and 25 firms, giving a 525 cities x 25 firms matrix of 13,125 media values. The matrix holds data on which firms have offices in which cities and how important each individual office is in the office network of the firm. The level of importance is coded between 0 (no office in the city) to 5 (headquarters), and the total value for a city is based on all firms' present media value. The list of firms included in the analysis presented in this paper includes the 25 largest media companies, by total sales, for which locational data were available. The various Globalisation and World Cities Indexes provide a unique way of quantifying the **global network connectivity** of cities, and are an excellent complement to the proposed CCI index that if licensing arrangements can be made, could be included in it.

The Shift Index

The Shift Index is largely an economic and technological index of cities and regions (Hagel, Brown & Davison 2009). It also incorporates indicators relating to network flows (more precisely knowledge and virtual flows), but its main endeavour is to augment familiar short-term metrics with indicators of **the velocity and magnitude of longer-term, secular forces** affecting people, cities and regions. It consists of three indexes designed to capture three waves of long- term, deep change. These are:

1. The **foundation** index;
2. The **flow** index;
3. The **impact** index.

[18] See also the work of Michael Curtin and his colleagues on world media capital at the Carsey-Wolf Center at UC Santa Barbara: www.carseywolf.ucsb.edu/mip/team. Curtin theorises 3 factors or dynamic influences that allow particular cities to emerge as media capitals: '(1) logics of accumulation, (2) trajectories of creative migration, and (3) forces of socio-cultural variation'. See: http://mediaresearchhub.ssrc.org/michael-curtin/person_view.

The *first wave* of change (the Foundation Index) involves the rapid and deep growth of *digital infrastructure* and the magnifying shifts in *global public policy* that have simultaneously reduced barriers to entry and movement (e.g. computing power per unit of cost, economic freedom index). This relates to our proposed inclusion of *digital literacy* in the CCI index. Intensifying competition and the increasing rate of change precipitated by the first wave shifts the sources of economic value from 'stocks' of knowledge to 'flows' of new knowledge.

The *second wave* of change (the Flow Index) is therefore characterised by increasing **flows of capital, talent, and knowledge** across geographic and institutional boundaries (e.g. movement of capital, migration of creative class, social network activity). This emphasises the induced mobility.

There is a tension between virtual- and location-based sources in this approach, which may over-emphasise virtual flows in the *production* of new knowledge. It is important to recognise that the creation of new knowledge typically occurs in physical space through face-to-face interactions, even though it is increasingly *distributed* via virtual flows. Indeed, the competitive flattening out associated with the digital democratisation of knowledge has paradoxically reasserted the importance of localness for global creative cities (a point that the CCI model of creative cities also develops).

Lastly, the *third wave* of change (the Impact Index) reflects the ability of companies to exploit the first two waves by enacting institutional innovations such as scalable, productive social learning systems (e.g. via widespread participation in mediated interaction; another feature of the CCI model). The Impact Index attempts to quantify these changes with indicators of performance of the firm and equity markets, consumer choice, and the value captured by talent.

The Shift index is thus a model for the CCI index in its underlying design to capture the **dynamic aspects of the digital economy**. Our CCI model seeks to further generalise this to the creative city.

World Knowledge Competitive Index

The World Knowledge Competitiveness Index was introduced by the Centre for International Competitiveness in 2002, and is published biennially.[19] The most recent edition of the WKCI compares 145 regions across 19 benchmarks to facilitate a comparison of the competitiveness of these regions from the perspective of the 'knowledge economy'. It defines the knowledge-based sectors as those primarily concerned with high-technology manufacturing and knowledge-based services such as telecommunications, IT services, and research and development activities.

The model employed in this index consists of four key components:

1. Capital inputs (knowledge capital, human capital, financial capital and physical capital);
2. Knowledge economy production;
3. Regional economy outputs (including knowledge economy outputs);
4. The sustainability link.

The cycle is sustained by **re-investment into capital inputs** (in particular knowledge capital and human capital) to support further development of the regional economy.

The extent to which this index is helpful to our study will depend on how closely our definition of the *creative economy* coincides with the definition of the *knowledge economy* used here. At this stage it is expected than numerous indicators will overlap and prove valuable (e.g. expenditure on education, number of registered patents).

Information Society Index

The Report on Cultural Life by the Finnish Ministry of Education and Culture is a compilation of indicators of cultural life and the information society; this is a sub-index of the 'Measuring Cultural Life and Involvement' study for that purpose (Picard, R, Gro¤ nlund, M & T Toivonen 2003: 17). The indicators of the information society sub-index focus on the potential to be part of the information society as well as the use of basic information and communications technologies. They relate to critical infrastructure and basic services necessary for **participation in the information society**.

[19] The 2008 edition is available for download online: www.cforic.org/downloads.php.

The index is not actually calculated, nor does it go into any detail of how it is to be calculated. It is a simply a suggestion of possible indicators that would go into such an index. It suggests a useful and detailed source of potential ICT-based indicators.

2.4 Other Approaches

The Oslo Manual

The Organisation for Economic Co-Operation and Development (OECD) document, *The Measurement of Scientific and Technological Activities, Proposed Guidelines for Collecting and Interpreting Technological Innovation Data*, also known as the Oslo Manual, contains guidelines for collecting and using data on **industrial innovation** (OECD and EURSTAT 2005). It does not focus exclusively on technological innovation (product and process innovations) but also includes organisational and marketing innovations. The Oslo Manual is a very influential standardised method of measuring innovation and is the starting point for many innovation surveys around the world. However, as with the European Innovation Scoreboard, by design it underestimates the role of culture and creativity in nurturing innovation because of its exclusive focus on *science-based measures* of technological change. This Manual, while august, therefore provides little guidance for our index.

Creativity Grid

The 'Creative Grid' approach is derived from a report for the *DCMS Creative Economy Programme: Infrastructure Working Group* prepared by Creative Consultancy (Fleming 2010). This study highlights 10 **infrastructural conditions for creative industries growth and competitiveness** and recommends that they provide the basis for a toolkit that tests the quality, capacity and links to the growth of the creative economy:

1. World class, high profile cultural infrastructure (e.g. galleries, museums, concert halls and events programs);
2. Specialist creative industries support services (e.g. business acceleration and investment programs, high quality network initiatives, and continuous professional development);

3. Specialist and accessible/affordable facilities for different parts of the creative industries (e.g. media centres, rehearsal space, studio space, and workspace);
4. Higher education sector (knowledge transfer, incubation and convergence programs, and strong links across creative and non-creative sub-sectors);
5. School education sector, plus a strong informal learning sector (mainstreaming creativity, identifying career paths, mentoring programs);
6. Spaces of convergence and connectivity (to meet, exchange and build relationships);
7. Global partnerships and trade initiatives (e.g. business-to-business relationships and partnership above competition);
8. Diversity advantage;
9. Creative clusters where processes of cultural consumption are symbiotic with processes of cultural production;
10. Cultural Infrastructure at the centre.

This report also posits that the main factors that influence the changing **relationship between creative individuals and organisations** include:

- Digital technology (e.g. podcasting, interactive tours, instant performance downloads and interactive performances)
- Third Spaces (Wi-Fi technology and work moving out of the office – third space between work and home)
- Branding (aimed at creative individuals)
- Internationalisation (e.g. exhibitions and tours)

These recommendations project (many of which have already been reviewed) are directly applicable to this and will therefore form part of the list of potential creativity cities indicators to be used.

Landry's Index

Charles Landry and his colleague Jonathan Hyams have developed their own creative city index.[20] It is a strategic tool to assess and measure the **'imaginative pulse'** of cities. This index was first developed in collaboration with the city of Bilbao and the Bizkaia

[20] hwww.charleslandry.com/index.php?l=creativecityindex.

region of Spain, and has since been applied to 7 other cities worldwide, including Australian cities Perth and Canberra, and Freiburg and Ghent in Europe. It provides a benchmarking facility for these cities. Landry's creative city index uses three elements – an internal assessment by the city, an external assessment by Landry's consulting group, and a web-based survey. Landry contends that there are ten 'creative city domains':

1. Political and public framework;
2. Distinctiveness, diversity, vitality and expression;
3. Openness, tolerance and accessibility;
4. Entrepreneurship, exploration and innovation;
5. Strategic leadership, agility and vision;
6. Talent and learning landscape;
7. Communication, connectivity and networking;
8. The place and place making;
9. Livability and well-being;
10. Professionalism and effectiveness.

Little detail of the indicators or metrics is publicly available, although Landry declares that within each of the ten defined domains there are identified key indicators of **creativity, resilience and the capacity to future-proof** a city. Landry's approach does however highlight that creativity is not the preserve of any single sector, and should be looked for across wide-ranging sectors:

- The **education and training** system: primary, secondary and tertiary education, professional development, lifelong learning;
- **Industry and business**: SMEs and large corporations, cluster initiatives, representative bodies such as the Chamber of Commerce;
- **Public administration** and public bodies and facilities;
- The **community and voluntary sector**: local societies, social action groups;
- **Cultural, tourism and leisure institutions**: arts organisations, gastronomy, the hospitality industry, and sports.

2.5 Conclusions of the Review

Substantial sets of indexes have already been created to map creative cities and global or world cities. Most of these have been developed within the past decade or so and, notably, none goes back through many decades. *Global city index construction is a new, emergent industry*. If we are to be guided by the evolutionary experience of industrial developmental logic, then we may reasonably expect that the future path will be a typical explosion of variety (as is already evident) followed by a competitive shakeout to arrive at a handful of institutionalised competing indexes (as appears imminent). Not all of these indexes will survive. Some may merge; others may vanish. Furthermore, some of the underlying methods and focuses may become more prominent while others are selected against, whether by a lack of demand, or by a withering of supply. It is unclear at present which of the 23 indexes we surveyed above will still be around in say 5 years. But the importance of this measure guarantees that some will still be around, in some atavistic form, in 20 or even 100 years. Now is the time in which such institutionalised definitions are being refined and selected. Our goal here, then, is to intersect this point with a proposal for a new ***integrated* and superior index**, not just *another* index. We believe that the opportunity and brief issued by the Beijing Research Centre for Science of Science arrives at a *crucial junction in the evolutionary history of global city index construction* by its willingness to address the seeming X-factor that accrues in many of the above indexes in relation to creative city dimensions.

It is not for us to say which of the above indexes might prosper and which might fall away. Some are more comprehensive and robust scientifically than others. Each has strengths and weaknesses and they are differentially useful and applicable, depending on the purpose. Instead of picking winners, we seek to **integrate the lessons** offered by each and any of the indexes to date into the construction of a better index.

Unfortunately, deciding what lessons are most important is not an easy matter. Few and perhaps none of the extant indexes have been appropriately tested against objective measures of actual city development and change. They are all **relative indexes** ('more' or 'less' measures, not measures of absolute values), which imply a projection (if City A is number one and City B is ranked, say, number 5, then A should perform better than B). But even such relativities have not been systematically and scientifically tested, not

least because the newness of the indexes has not allowed for data about longitudinal trends to be gathered. At the moment the assessment of an index is not based on what is objectively accurate, as with, for example, a consumer price index that measures inflation, which will soon enough be proven right or wrong. Currently the evaluation of respective indexes is mostly about media, networks of influence, and citations, yielding relative values (City A has more of Factor K than City B). However, relativity is not uncommon in science – for instance geology was founded on the relative ages of rock, until radiogenic dating enabled absolute age to be calculated; and still relative age is important – it's important to know if a rock is Cambrian or Cretaceous if you're looking for fossils, or for calculating the age of inaccessible rocks (e.g. from other planets). Thus, a **comparative approach using relative values** is appropriate for the kind of data presently to hand.

3. Elements of the CCI Creative City Index

"One wants to live in places which are large and complex, where you don't know everyone and you don't always know what's going to happen next. Cities are places of opportunity but also of conflict, but where you can find safety in a crowd. We also have to acknowledge that these cities that come top of the [liveability] polls also don't have any poor people…. (So) The other big question … is can someone coming from somewhere else improve themselves, reinvent themselves? Is there upward mobility? … London and New York are magnets for immigrants precisely because they allow those kinds of new beginnings."

Edwin Heathcote, *Financial Times* (2011)

3.1 Theory of CCI Creative City Index Indicators

What is a creative city? What are its aspects and properties, and how does it differ, if at all, from a global city? Is, thereby, a creative city index (Y) simply an addition to extant global city indexes (X), as in all such inclusive X measures plus this additional Y suite of measures (i.e. X + Y)? Or is that new Y suite that we propose actually an alternative formulation to X (Y not X)? Or is it really a new and complex X-Y hybrid that is proper and true? Is a creative city a different concept and measure from a global city?

Our view is that a creative city is not the same as a global city. Rather, the relation is that between a germinal seed and the resultant organism; a creative city comes first. A creative city can (but may not) become a global city. Attempts to create a global city cannot succeed unless it passes through the stage of becoming a creative city first, in some way.

We hypothesise that to become a global city, it is necessary to first be a creative city. Such a theory implies both a developmental and an evolutionary logic. We believe it to be true regardless of the initial size of the city. We suggest the historical evidence supports or at least does not reject this proposition. Every global city can be identified with a prior (and often continuous) creative apogee.

A global city is the 'adult' form of a creative city, in the developmental metaphor. But equally, pursuing the metaphor, one cannot create a global city *ab nihilo*, from bare land and imagination. The difficulty of achieving creative, never mind world, status for planned cities is demonstrated in the relation between federal capitals and world cities in, for instance, the USA (Washington DC), Australia (Canberra), Brazil (Brasilia), Nigeria (Abuja) and Burma (Naypyidaw). In no case do these forgettable capitals outshine the organically nurtured world city of their respective countries – New York, Sydney, Rio, Lagos or Rangoon. Such ventures are nevertheless plentiful, from the proposed Charter City movement (*á la* Paul Romer), the new 'aerotropolises' such as New Songdo City in Korea, to the many new cities currently underway in China.[21] These will certainly be cities, some of them very large. While there is good reason to create and develop such new cities, their chances of becoming world cities are small until they have pupated through the necessary larval stage of being a creative city, which cannot be engineered or designed in such a way.

This applies even where the designer of the green-field plan is creative to a fault, as was the case with architect Walter Burley Griffin for Canberra. He believed that: 'I have planned a city that is not like any other in the world. I have planned it not in a way that I expected any government authorities in the world would accept. I have planned an

[21] It is instructive to recall previous doomed ventures such as the Multifunction Polis in Australia: http://en.wikipedia.org/wiki/Multifunction_Polis; and on a smaller scale the mixed career of planned 'garden cities' and 'new towns' in the UK, such as Welwyn Garden City (England), Cwmbran (Wales), and Cumbernauld (Scotland).

ideal city – a city that meets my ideal of the city of the future' (Wikipedia: Walter Burley Griffin). And Canberra is well endowed with cultural institutions and notable architecture. But after a century it has never acted as an attractant; its creativity is planned too, not self-organised by a heterogeneous population pursuing their own entrepreneurial and creative interests. Australia's creative and world cities remain Sydney and Melbourne; Canberra retains the atmosphere of a town for bureaucrats.

Thus we advise **caution in pursuing a 'real-estate' model of city development**. It misunderstands the forces that shape city development and evolution in the specific dimension of creativity. Cities develop organically by continual infusion of new talent and ideas, and by the annealing and selection that produces. Great cities are evolved, not designed.

Only small cities have great leaders; great cities find their own path. Great cities are the outcomes of clashes and conflict of systems of value and meaning as much as of harmony and community within such systems of value and meaning. These transplant only with great difficulty and only under exceptional circumstances. Hong Kong and Singapore became global cities through the synergistic creative energy of expat immigrants (from Britain, the Mainland, and across SE and South Asia) and local citizens (themselves of different origins) faced with open spaces of opportunity. In both cases the cities were built up rapidly from small beginnings in pursuit of trade and empire, but their dynamism and innovation came from individuals seeking to take advantage of these opportunities, not from being designed in advance. This highlights the basic limitation of the 'real-estate' approach: it has no built-in system of value because such systems are social and cultural complexes that are contained in cultural and institutional forms, not in buildings or street-plans. No great city can form without first being a dynamic and creative city, and those values arise from the self-organised interactions of myriad people, not from blueprints. We doubt that there are exceptions to this rule.

Great cities develop from within, but they do so by infusion from without. This is the seeming paradox of great city development. It grows from internal feedback, but it does so by infusion from external energy. The resolution of this paradox is to recognise that a great city is a *complex dissipative system*, as Jane Jacobs first described in 1970. What matters is access to its flow of energy in order to participate, which it to say, to be a

citizen in the entrepreneurial sense – to have a voice, or at least the prospect of such. In a creative city, this is an expectation: an incomer can enter, find a voice and an audience, and may make a difference, regardless of their identity or the content of their idea.

Thus, traditional objective measures of population or market growth are a necessary but not sufficient condition for assessing creative cities. To predict a creative city, we need also to know how it facilitates expression of new ideas and how well it can adapt to forms of meaning and value that point to the future not the past. How does a city perform as an *experimental space* for those of its own citizens whose lives centre about such experimentation? As a demographic cohort, these are both *the young*, who are seeking to start their productive lives and who have weak ties to existing arrangements, and also the *entrepreneurs* and *immigrants* who seek to reinvent or improve their lives. All succeed only to the extent that they can also change the lives of those around them, which they do so only by altering their assessments of meaning and preferences over value. In a creative city, citizens must be *open to change* their values and preferences, to recast their assessments of meaning, in consequence of the examples and bidding of socially networked and trusted others. To the extent that this *social learning process* can happen, cities are constitutionally creative and can thence potentially become world cities.

World cities are therefore creative in the sense that they are spaces where **meaning and value are open to contestation** and where **social learning** can occur. They will by definition be sites of turbulence and conflict, not in a warring sense but rather as spaces of **experimentation, negotiation, dissonance and discovery** (see Hayek 1965, Popper 1965, Rodrik 2008, Stark 2009). Such uncertainties are navigated, from the point of view of individual agency, with 'teleological' **purposefulness** (in Veblen's sense; see Hodgson 1998: 423) that marries maximum potential advantage to the self with maximum attention – and with that, changed behaviour – from the social network (Lanham 2006).

This balance is hard to get right for individuals, never mind societies. By its very nature it cannot be planned, for a plan supposes prior knowledge of the outcome. A creative city is an experimental space. It does not know where it is going next, which makes it a politically difficult space to inhabit. It cannot have great leaders, only great custodians.

But it can indeed have great citizens. Few could name the mayors of London or Paris through the 18th or 19th centuries, but many people know their great citizens through that time. Similarly, many people can name famous denizens of 'Silicon Valley' for example but they would be hard pressed to name the political leaders of that 'city', much less the real-estate developers of the garages, lofts and offices in which now-global corporations had their beginnings. Creative global cities are known by the achievements of their citizens.

3.2 Capturing Dynamics of Change

In order to capture the dynamics of population-wide creative productivity in relation to meanings and values, brokered through the competitive clash of different institutions and networks that nevertheless together comprise the overall complex dynamic systems which compose creative cities, we need to use the insights discussed above to generate a new approach to the Creative City.

First, what a creative city *is not*. **It is neither a medieval city nor a modern one**. Both of these types maintain their attractions, especially for tourists, but in relation to creative dynamics they are both examples of 'sunk capital'. Table 9[22] charts the overall historical trend, which goes well beyond the organisation of cities. The migration of causal agency along the 'value chain of meaning' correlates positively with historical epochs in the modernising West: from the medieval era (producer/ authority); via modernity (commodity/ distribution/ text); to globalisation (user/ consumer/ audience). Thus, for *creative cities in the emergent global epoch*, the values in the right-hand column (column 3) of the table should be recognised as the **dynamic sources of meaningfulness and value**. We argue moreover that, historically, **the city is a coordinating mechanism** for generalising these values among otherwise diverse populations and heterogeneous institutions. Here it may also be argued that the city is *increasing* in importance in this coordinating function as the force of the nation-state as agent of control has declined with the modern era. The CCI Creative City Index therefore identifies and measures indicators of these values, rather than seeking to preserve the modernist values of column 2.

22 Adapted from Hartley 2009: 16-17; © J Hartley.

Table 9: The Value Chain of Meaning and Global Cities

Era	1. Premodern	2. Modern	3. Global
Value Chain			
Of merchandise	Origination/ production	Commodity/ distribution	Consumption/use
Of meaning	Author/ producer	Text/performance	Reader/audience
When, where, who (time, place, population)			
When	Medieval	Modern	Global
Where	Church	Public sphere	Private life
Who (population)	The faithful	The public	DIY citizen
Who (Intermediary)	Priest	Publisher	Marketing
How (regime)			
Theorist	Bible	Marx	Foucault
Subjectivity	Soul	Individual (-ism)	Experience
Power base	Pain of death/hell	War	Administration of life
Sovereignty	Monarch/divine	Nation state	Self
Military unit	Knight/crusader	Conscript/ volunteer	Terrorist
Enemy	Peer/heretic	Country	Civilian
State	'Hobbesian'	'Machiavellian'	'Kantian'
Why (knowledge)			
Philosophy	Revelation	Scarcity	Plenty
Epistemology	Theology	Empiricism	Plebiscite
Educational reach	Elite	Mass	Universal
What (form)			
Interpretive form	Exegesis	Criticism	Redaction (editing)
Creative form	Ritual/liturgy	Realism (science/ journalism/novel)	Reality (TV)
What for (communicative politics)			
Mode of literacy	Hear only	Read only	Read/write
Mode of address	To convert	To convince (campaign)	To converse

Who says (choice control)			
Source of control	'Him' – divine control	'Them' – expert control	'Me' – self control
Broker of choices	No choices	Publisher/provider	Navigator/ aggregator
Agent of knowledge	Cleric	Reading public/ media audience	'Consumer entrepreneur'

Recalling the discussion of the difference between 'power' cities and 'enterprise' cities that we identified at the outset of this report, the 'attractant' or creative city therefore emerges from the globalising values on the right of Table 10 below, rather from the premodern and modernising ones on the left:

Table 10: Differentiating the Creative City

	"World City"	"Creative City"
Source	Empire (court)	Institution (rules)
Locus	Castle/palace (politics)	Port/hub/fair/marketplace (commerce)
Value	Greatness (past)	Attractant (potential)
Competitive Advantage	Size/power	Inflow/smarts (crucible of ideas)
Dynamics	Growth	Non-linear dynamics
Resources	Sunk capital	Complex of factors (capable, entrepreneurial people)
Driver	Leadership	Enterprise
Outcome of …	Monarchical power	Mobile-elite choices
Temporality	Past	Present/future

In relation to the specifics of the arts and creative culture, these oppositions play out as follows (Table 11) – again, a creative city (as opposed to a powerful city) displays the values on the right:

Table 11: Differentiating the Creative Arts

Mode	Art	Entertainment
Locus	Cultural institution (GLAM)[23]	Scene, festival, mall, novelty
Value	National identity	Global diversity and difference
Attractant	Prestige ("to see the queen")[24]	Social network (media, music, clubs, crowds)
Agency	Citizenship	Digital literacy

In relation to the historical dynamics of *mediated communication*, globalised creative cities are **digitally based**, differing from previous epochs as the terms in Table 12 indicate.

Table 12: Differentiating the Media of Communication

Era	1. Premodern	2. Modern	3. Global
Medium	Oral/manuscript	Print	Digital/online

3.3 Youth and Population Dynamics

In order to capture this emergent, future facing or 'attractant' city, we focus on the growing importance of youth. As a cohort, they are willing agents of risk and uncertainty, operating as both producers and consumers of experimentation and novelty in a social-network system of cultural entrepreneurship and consumer creativity. Further, as a global demographic, youth is under-recognised in much contemporary policy work, which tends to assume it is catering for an older demographic, from which elite arts producers and consumers are drawn. There is also much written about the aging demographic in many countries, including China, and certainly the overall profile of humanity is aging. However, entrants to the future workforce, those who are most interested in experimenting with novelty and willing to risk change, and who are currently educating for a creative, enterprising, and increasingly urban future, are

[23] GLAM = Galleries, Libraries, Archives, Museums

[24] As in the nursery rhyme: 'Pussy cat, pussy cat, where have you been? I've been to London to see the Queen.' – Traditionally, it's the obvious reason for ordinary folk to visit the capital.

predominantly drawn from the 0-24 age group. By 2050 there will be around 3.5 billion people under 25 worldwide. Of these, almost 1.65 billion young people will live in China, Europe, India and the USA alone, and another 1.8 billion – a majority – in all other countries:

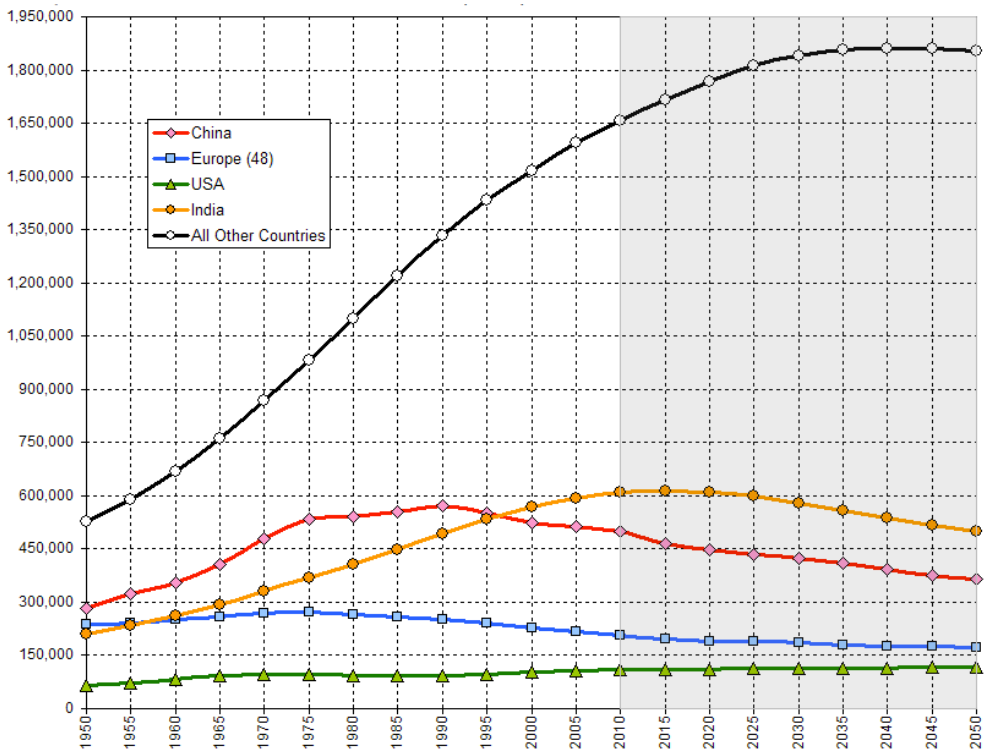

Figure 4: World Population of Young People to 2050 (UNDESA 2009)

Among those youngsters, the current estimate of people between the ages of 10 and 25 – the group most active in future forming – is more than 1.8 billion. This is what the UN calls a 'demographic dividend', providing the 'labour and skills needed to rebuild cities, economies and lives' (UNFPA 2010: 47-9). One may add that they will also be the cohort that *reinvents* the city, through their own ideas, usages, and interactions.

While providing for young people is a challenge, an aging population is also a challenge, particularly for innovation dynamics. Here, counter-intuitively, China may have more to worry about than the USA. According to one observer: 'Surprisingly, the process of population aging is much less dramatic in the United States of America than in China or

Europe – both due to higher fertility and a large number of (young) immigrants' (China-Profile).[25]

We believe that dynamic, future-facing creative cities will be characterised by a relatively high total number of both residents and immigrants in the youth cohort, and that there will be increasing pressure on China to compete internationally. Furthermore, by one calculation, Beijing currently ranks only 20th among the world's 'agglomerations' of total population (all age-groups), after Tokyo (34.3m), Guangzhou, Seoul, Delhi, Mumbai, Mexico city, New York (incl. Newark, Paterson), Sao Paulo, Manila, Jakarta, Shanghai, Los Angeles, Karachi, Osaka, Kolkata, Cairo, Buenos Aires, Moscow, Dhaka and Beijing (14m).[26]

The CCI Creative City Index proposes indicators for the components of a city's population (both existing residents and incoming immigrants) that may yield a 'demographic dividend' for creativity while recognising that mere size isn't everything. This requires a focus on the 10-25 years old cohort (teens and young adult), with indicators clustered around the main 'attractant' affordances for this cohort. Such attractants will certainly include aspects of 'youth culture' – media, music, festivals, clubs, crowds, scenes, malls – but these may not be the most important resources. Philosopher René Descartes dubbed Amsterdam, an early 'world city', an '**inventory of the possible**' (Brook, 2008: 8).[27] That 'inventory' is the main 'attractant' for incoming and emergent youth.

A recent article by the *Financial Times*' architecture critic, Edwin Heathcote, has made the case for what attracts people to cities – it isn't a 'liveability' index (routinely won by 'boring' cities) but '**complexity, friction and buzz**'. He prefers 'places which are large and complex, where you don't know everyone and you don't always know what's going to happen next; places of opportunity but also of conflict, but where you can find safety in a crowd.' He asks, can *poor* people and *immigrants* 'improve themselves, reinvent themselves? Is there upward mobility?' He cites London and New York as

[25] See: www.china-profile.com/data/ani_ceu_pop.htm.
[26] Source: www.citypopulation.de/world/Agglomerations.html. By contrast, London ranks 24th; Paris 26th; Sydney 75th. See also: www.citypopulation.de/cities.html.
[27] T Brook (2008) *Vermeer's Hat: The Seventeenth Century and the Dawn of the Global World*. London: Profile Books.

'magnets for immigrants precisely because they allow those kinds of new beginnings.'[28] He adds his own sidebar checklist of 'what makes a city great': (1) Blend of beauty and ugliness; (2) Diversity; (3) Tolerance (4) Density; (5) Social mix; (6) Civility. These – and a substantial youth demographic – are the values that need to be captured in a creative city index.

3.4 Indicators from Existing City Indexes

The following indicators (Table 13) are carried over from the index library surveyed in Chapter 2 above. Many of these 'themes' are incorporated and merged into our final index construction.

Table 13: 16 General Themes of City Index Dimensions

1. Culture, Recreation & Tourism
2. Creative Output & Employment
3. Cultural Capital & Participation
4. Venues, Resources & Facilities
5. Liveability & Amenities
6. Transportation & Accessibility
7. Globalisation, Networks & Exchange
8. Openness, Tolerance & Diversity
9. Human Capital, Talent & Education
10. Social Capital, Engagement & Support
11. Government & Regulations
12. Business Activity & Economy
13. Entrepreneurship
14. Innovation & R&D
15. Technology & ICT
16. Environment & Ecology

[28] E Heathcote (2011) Liveable v lovable. *Financial Times.* www.ft.com/cms/s/2/dd9bba18-769c-11e0-bd5d-00144feabdc0.html#ixzz1LpVGLjVB. In the ensuing discussion of 'which is the best city' Beijing was not mentioned (nor any city in Australia).

3.5 The CCI Creative Industries Model, and the Indicators Derived From It

The following sections 3.5 and 3.6 outlines the indicators that we used as a starting set from which we then refined our eventual indicator suite. These are based on the indicators that we derive directly from the CCI model as well as a suite of 'additional' indicators that we derive from the other indexes reviewed above.

We present this full set here because many of the eventual refinements in the six-city survey were partially based on data availability, data consistency or cost considerations, and a more expansive or comprehensive index would seek to re-include these considerations.

Because these classification sets and indicator suites are based upon our theory of the creative economy it will be instructive to summarise here what we mean by a creative economy as derived from our focus over the past decade at the CCI on the creative industries. In brief, we have identified four distinct versions of the creative industries as associated with different classes of definition. They are:

CI-1 Creative clusters (an industry definition)
CI-2 Creative services (an economic definition)
CI-3 Creative citizens (a cultural definition)
CI-4 Creative cities (a complex definition)

CI-1: Creative Clusters

Table 14: CI-1 Creative Clusters

Industry definition
Closed expert pipeline of innovation (internal to the firm)
Creative clusters of different industry sectors – advertising, architecture, publishing, software, performing arts, media production, art, design, fashion etc. – that together produce creative works or outputs (e.g. the DCMS list)

Provider-led or supply-based definition – institutional (meso level) creativity; measures of elaborate production by specialist organizations
'Creative outputs' – i.e. consumer goods based on creative values, including music, writing, design, performance

CI-2: Creative Services

Table 15: CI-2 Creative Services

Economic definition
Closed expert system of innovation (professionals across firms)
Size of 'creative services' – creative inputs by creative occupations and companies
Value-added to 'non-creative' sectors (e.g. health, government) by creative services – institutional (meso level) creativity
Measures of employment of specialist creative people (professional designers, producers, performers and writers)

CI-3: Creative Citizens

Table 16: CI-3 Creative Citizens

Cultural definition
Open innovation network (innovation from beyond firms and professionals)
Number of 'creative *citizens*' – population, workforce, consumers, users, and entrepreneurs, artists
Personal (micro level) creativity/microproductivity/market-based and non-market
Focus now on user productivity (cloud computing, crowd-sourcing, etc.)
Social media/user-created content
Measures of emergent production from social networks
Scaled-up via micro-productive institutions (e.g. YouTube, Google)

CI-4: Creative Cities

Table 17: CI-4 Creative Cities

Urban mixture definition
Clash and friction between systems: industry/economy and culture (e.g. in conflicting interests in the sharing of IP)
Sites for social meeting and mixture as well as friction: connecting culture and economy, diversity, tolerance, civility
Creative cities are therefore those that cohabitate all four types – industry, economy, culture, and city
Population-wide (macro level) creativity

We are proposing that the four phases noted above, CI-1 to CI-4, also form four distinct **models**, not based on trying to define ever-more tightly how creativity *is an industry* but, on the contrary, on showing how creativity needs to be accounted for at ever-increasing *distance from industry*. It is not until we reach stages CI-3 and CI-4, where creativity reaches cultural dimensions located in cities, rather than being confined to production processes located in firms, that the connections between culture and economy, individual talent and societal scale, can come into focus.

Furthermore, it is only at that point that we can take proper account of the growth of ICTs, digital media and the Internet, because these are now not simply in-company efficiency-technologies (as IT once was), but whole-of-society cultural forms (as the Internet now is). In other words, if we confine the notion of creative industries to the traditional (i.e. analogue) creative arts and their industrial or occupational form, we cannot account for the importance – both economic and cultural – of user-created content and the burgeoning scale of computer-enabled social networks. Since these are clearly important drivers of the creative industries, we need all four models before we can develop an index to explain creative innovation, never mind the integration of cultural and economic meanings and values.

Finally, CI-4 reminds us that these developments are competitive and uneven across space as well as time – some cities are creative innovation 'spikes' compared with others. Some important examples and points relating to the interaction of these four levels in a creative city are summarised below.

Interaction of CI-1 and CI-2 with CI-3 and CI-4

Table 18: Interaction and Intermediation of the CCI Models

Institutions intermediating economy (CI-1 & CI-2) and business/social/virtual networks (CI-3 & CI-4)
Coordination between models/levels
Intermediaries who facilitate interactions between CI's
Anchor firms (innovative companies that stimulate the growth of many others e.g. Microsoft helping create the software cluster in Seattle)
Mediating organizations (institutions for collaboration or mediating, exchange of information)
Outstanding university research and commercial linkages (conduit for establishing key social networks e.g. internships, visits by industry leaders)
High-end cultural institutions including galleries, museums and universities
Commercial or entrepreneurial enterprises including street markets, shopping malls and the HQs of global media companies

3.6 Other Indicators

Based on the CCI Creative Industries Model and the extant creative cities literature hitherto reviewed, we can highlight numerous other issues and potential indicators for consideration. Tables 19-27 outline these aspects in terms of:

- Infrastructure and Institutions;
- Interaction of Agents;
- Cultural Complexity, Clustering and Networking;
- Creative Milieu;
- 'Virtual' Clustering and Networks;
- Population Characteristics;
- Formal and Informal 'Creative' Education;
- Clash of Systems, Generations and Cultures;
- Urban Environment and Attractions.

Infrastructure and Institutions

Creative cities have the infrastructure, institutions and public capital for the production and development of new ideas.

Table 19: Infrastructure & Institutions

For ideas to be implemented
Copyright laws/intellectual property vs. innovation/emergence/sharing
Suitable arts, culture and *entertainment* infrastructure
Ancillary service industries (e.g. media post-production, fashion, tourism)
Structure of the sector/s (e.g. concentration of TNCs and micro enterprises)
Interactions between public and private in the sector
Key educational institutions
Buildings, transport systems, communications infrastructure and public institutions

Interaction of Agents

Creative cities link consumers and producers. This means a vibrant local scene of consumption as well as production.

Table 20: Interaction of Agents

For ideas to be generated and propagated
Relations among networked agents (producers or consumers)
Social learning via widespread participation in mediated interaction
Social contagion dynamics/social network markets (Potts et al 2008a)
Role of the consumer/integration of consumer and producer

Cultural Complexity, Clustering and Networking

Creative cities build the social connections and networks along which social learning and copying enables creativity to spread, replicate, and develop.

Table 21: Clustering & Networking

Social networks, connections and human interactions
Connectedness to global system/network (flows of information, data, trade, and creativity)
Nodes for global transactions (key place in global service industries; central hubs in communications and transportation networks)
Clash between global flows and local agency (national/local networks)
Inner-city clustering (density)/suburban and urban ecologies
Cultural quarters (nexus of networks and urban cultural infrastructure)
Meso level (urban development and cultural dynamics)

Creative Milieu

Creative cities bring together complementary practices of cultural production and consumption.

Table 22: Creative Milieu

Creative opportunities, marketplaces, spaces
Integration of cultural and economic/interaction between productive consumers and creative enterprise/relationship formation
'Novelty bundling markets' (scenes, festivals, competitions, awards, venues allowing integration of culture and economy, productive consumers and creative enterprise)
Concerts, festivals and other dually-productive/participatory events
Integrate expert and amateur
Integrate play and work

'Virtual' Clustering and Networks

Creative cities are digitally connected. Citizens have digital literacy.

Table 23: 'Virtual' Clustering & Networks

Online digital networks
Social networks, real or online
Digital technologies/social networks
Technologically equipped culture
Entrepreneurial (or experimental) consumption (signalling, social learning)
An advanced communications infrastructure on which modern transnational corporations rely, such as fibre optics, Wi-Fi networks, cellular phone services, and other high-speed lines of communications

Population Characteristics

Creative cities have populations that tend to be energetic, young, ambitious. These can be characterised by early adopters open to experimentation and novelty.

Table 24: Population Characteristics

Citizen demographics and profiles
Youth quotient
Consumer/audience sophistication or attentiveness
Population creativity
Experimental consumers
Social dynamics
Creative class/density
Human resources, patterns of use, micro-level
Highly skilled and ambitious people
Risk-taking, creatively talented, technologically capable, and energetic

Formal and Informal 'Creative' Education

A creative city develops formal and informal education pathways. Formal measures would include credentialed 'fine' arts education or film or dance schools for example; informal creative education would include participation or media exposure and experience.

Table 25: Education, Social Learning & Experimentation

Formal and informal education including social learning
Number of students/universities/institutions
Experimentation, learning and adaption (informal, peer-to-peer);
Emergence of novelty/innovation/discovery
Input prices (range of price indexes) to education, learning and innovation
Velocity of ideas, or churn/turnover of new fads, fashions, styles, etc.

Clash of Different Systems, Generations, and Cultures

A creative city will tend to be a complex space that generates interactions of ideas from different demographics, cultures and economic activities; creativity emerges from the clash and conflict of differences. It will have attractive natural and built environments (and the criteria of 'attractiveness' will differ for different demographics), a diverse range of people, and vibrant street life (see cover picture).

Table 26: Cultural Clash

Diversity and quality of place
Competition/contestation
City density
Urban metabolism rate (population turnover)
Places in flux – new socioeconomic and ethnic groups, challenge to an old, established order)
Culturally diverse populations (multiculturalism, backgrounds, experiences and talents) and tolerance
Subversion of conventional wisdom
Clusters of people/visitors/consumers (diversity of clusters)
Festivals, events, happenings, novelty, places to mingle, scenes, competitions, venues
The role of 'place'/localness

Urban Environment and Attractions

A creative city will have a level of amenities and a sufficiently attractive and interesting urban environment that induce people to move to the city because of the lifestyle.

Table 27: Urban Planning & Attractions

The creative city attracts creative citizens
Large-scale events (arts, showcases, tourism, etc.)
Cultural tourism; cultural resources, heritage, and symbolic assets
Drawing power of cities (related to culture/creativity)
Attraction, retention and leakage of populations and/or other resources
Self-expression, civic pride and community identification
Urban amenities (e.g. outdoor dining, walking streets, vibrant night life, river walks)
Outdoor recreation activities (e.g. urban kayaking, rock climbing and bike trails)
Historic as well as modern structures, excellent public transportation, diverse residential neighbourhoods, a variety of foot traffic, wide sidewalks, and different types of buildings, open and green spaces, vibrant downtowns and centres of learning
Infrastructure fostering creativity (e.g. arts and culture, nightlife, music scene, restaurants, artists and designers, innovators, entrepreneurs, affordable spaces, lively neighbourhoods, spirituality, education, density, public spaces and third places)
Inherited features (e.g. history, climate, natural resources and population)
Housing affordability (including renters, owners with mortgage, and owners without mortgage)
Affordability, free events, public infrastructure, commons
Vital network of mixed-use informal spaces and passageways (pockets of social activity and neighbourhood life)
Edge spaces and adjacent suburban residential zones (many multicultural forms come from these in-between spaces e.g. hip hop)
Income and wealth inequality and social safety net

4. The CCI Creative City Index and Results

> *Why do we need such a retooling of the conceptual apparatus? In essence, the defining characteristic of the modern economy is extremely rapid technological, organizational and institutional change, all embedded within broader patterns of social change. It is as simple as that. Change happens, it happens broadly and deeply, and we require a framework for analysis of its economic aspects… It is connections that are changing, and this requires a formal framework that makes connections the prime variables.*
>
> Jason Potts (2000), pp. 4-5

4.1 The CCI Creative City Index

The CCI Creative City Index comprises 8 categories of sub-indexes:

1. CREATIVE INDUSTRIES SCALE, SCOPE & EMPLOYMENT
2. MICROPRODUCTIVITY
3. ATTRACTIONS & ECONOMY OF ATTENTION
4. PARTICIPATION & EXPENDITURE
5. PUBLIC SUPPORT
6. HUMAN CAPITAL & RESEARCH
7. GLOBAL INTEGRATION
8. OPENNESS, TOLERANCE & DIVERSITY

We contend that these eight categories, which will be discussed below in relation to their pilot estimates, define dimensions that are both sufficiently uncorrelated yet additively complementary aspects of what makes a 'creative city'.

This chapter outlines the findings of the estimates of the CCI Creative City Index and offers some discussion and justification for the various indicators and measures involved.

At present, the index has been tested on six cities (Brisbane & Melbourne in Australia, Berlin & Bremen in Germany, and London & Cardiff in the UK). These cities were chosen to provide a mix of countries with differing economic and industrial backgrounds. We also chose one large and culturally dominant city (London, Berlin and Melbourne) and a second tier city that was nevertheless still a significant economic and cultural hub (Cardiff, Bremen, Brisbane).

While the pilot would have been strengthened with additional city estimates for developing country cities, such as in Indonesia or Brazil for example, budget constraints and language limitations mean that we have only tested the results on these six. There remains much further work to develop and extend this index to other cities and countries.

4.2 Headline Results

The unweighted (or equally weighted) index results over the eight index dimensions are presented in Table 28 below.

Summary

Table 28: Summary of CCI Creative City Index Results

CCI CREATIVE CITY INDEX	Brisbane (AUS)	Melbourne (AUS)	Berlin (GER)	Bremen (GER)	Cardiff (UK)	London (UK)
1. CREATIVE INDUSTRIES SCALE, SCOPE & EMPLOYMENT	49.8	54.4	53.4	49.2	51.7	96.6
2. MICROPRODUCTIVITY	37.0	41.8	56.3	39.2	49.2	83.6
3. ATTRACTIONS & ECONOMY OF ATTENTION	15.7	30.8	54.9	12.6	10.7	97.8
4. PARTICIPATION & EXPENDITURE	37.0	41.5	69.5	54.6	37.8	79.8
5. PUBLIC SUPPORT	100.0	80.1	77.3	79.3	68.5	94.4
6. HUMAN CAPITAL & RESEARCH	41.8	48.9	75.2	54.8	50.2	75.6
7. GLOBAL INTEGRATION	40.5	52.2	46.0	28.3	25.4	76.7
8. OPENNESS, TOLERANCE & DIVERSITY	67.5	76.0	74.0	70.5	63.6	76.5
CCI CREATIVE CITY INDEX	**48.7**	**53.2**	**63.3**	**48.6**	**44.5**	**85.1**

The results are **uncorrelated**, in that no dimension can be transformed into another (even to within 10 percent) by any simple scalar multiplication. This means that the eight dimensions are efficient (i.e. there is no smaller set that would produce the same index). It is of course possible that further dimensions might be added.

The results are also **robust**, in that the rank order is approximately preserved across most dimensions (public support per capita and openness being the two main exceptions to rank order equivalence). This can be seen in the rank order table (Table 29) below.

Table 29: Rank Order of CCI Creative City Index Results

CCI CREATIVE CITY INDEX RANK	Brisbane (AUS)	Melbourne (AUS)	Berlin (GER)	Bremen (GER)	Cardiff (UK)	London (UK)
1. CREATIVE INDUSTRIES	5	2	3	6	4	1
2. MICROPRODUCTIVITY	6	4	2	5	3	1
3. ECONOMY OF ATTN.	4	3	2	5	6	1
4. PARTICIPATION	6	4	2	3	5	1
5. PUBLIC SUPPORT	1	3	5	4	6	2
6. HUMAN CAPITAL	6	5	2	3	4	1
7. GLOBAL INT.	4	2	3	5	6	1
8. OPENNESS	5	2	3	4	6	1
CCI INDEX RANK	**4**	**3**	**2**	**5**	**6**	**1**

Sensitivity Analysis

Setting the weight of each sub-index to zero derives the following sensitivity analysis results (Table 30). The percentage values tell as how much the final CCI Creative City Index changes for each city when sub-indexes are successively dropped-out of the index. The average is simply the average over all six cities. For example, when we drop "5. PUBLIC SUPPORT" from the index by setting $w_5 = 0$, the index scores for all six cities decrease by 18.9% on average – quite a large amount. (Brisbane's index score falls by 26%!) Indeed, all of the sub-indexes have a significant impact and should remain in the index.

Table 30: Sensitivity Analysis of CCI Creative City Index Results

CCI CREATIVE CITY INDEX	Avg.	Brisbane (AUS)	Melbourne (AUS)	Berlin (GER)	Bremen (GER)	Cardiff (UK)	London (UK)
1. CREATIVE INDUSTRIES SCALE, SCOPE & EMPLOYMENT	-12.8%	-12.8%	-12.8%	-10.5%	-12.7%	-14.1%	-14.2%
2. MICROPRODUCTIVITY	-11.1%	-9.5%	-9.8%	-11.1%	-10.1%	-13.8%	-12.3%
3. ATTRACTIONS & ECONOMY OF ATTENTION	-7.1%	-4.0%	-7.2%	-10.8%	-3.2%	-3.0%	-14.4%
4. PARTICIPATION & EXPENDITURE	-11.6%	-9.5%	-9.7%	-13.7%	-14.1%	-10.6%	-11.7%
5. PUBLIC SUPPORT	-18.9%	-25.7%	-18.8%	-15.3%	-20.4%	-19.3%	-13.9%
6. HUMAN CAPITAL & RESEARCH	-12.7%	-10.7%	-11.5%	-14.8%	-14.1%	-14.1%	-11.1%
7. GLOBAL INTEGRATION	-9.6%	-10.4%	-12.3%	-9.1%	-7.3%	-7.2%	-11.3%
8. OPENNESS, TOLERANCE & DIVERSITY	-16.2%	-17.3%	-17.8%	-14.6%	-18.2%	-17.9%	-11.2%

Similar sensitivity analysis can be performed for the rank order of the cities when sub-indexes are successively dropped-out of the index. Table 31 below illustrates that the rank order of the CCI Creative City Index changes very little when we do so – for example, when we remove "3. ECONOMY OF ATTENTION" from the index by setting w_3 = 0, Brisbane drops a rank with Bremen taking its place. This, couple with the previous index score sensitivity analysis results, is encouraging as it suggests that our results are robust qualitatively (rankings) but variable quantitatively (scores between 1-100). That is, by removing a dimension (or include an extra one) we impact the numerical scores (meaning that the dimensions are not simply linear combinations and redundancies). Conversely, given that the ranking ordering is almost perfectly preserved across

dimensions we have a degree of confidence that our results are portray a consistent story about relative city performances.

Table 31: Sensitivity Analysis of Rank Order of CCI Creative City Index

CCI CREATIVE CITY INDEX RANK (DIFF.)	Brisbane (AUS)	Melbourne (AUS)	Berlin (GER)	Bremen (GER)	Cardiff (UK)	London (UK)
1. CREATIVE INDUSTRIES	0	0	0	0	0	0
2. MICROPRODUCTIVITY	0	0	0	0	0	0
3. ECONOMY OF ATTN.	-1	0	0	1	0	0
4. PARTICIPATION	0	0	0	0	0	0
5. PUBLIC SUPPORT	-2	0	0	1	1	0
6. HUMAN CAPITAL	0	0	0	0	0	0
7. GLOBAL INT.	-1	0	0	1	0	0
8. OPENNESS	0	0	0	0	0	0
CCI INDEX RANK	**4**	**3**	**2**	**5**	**6**	**1**

4.3 Index Sub-Components: Method and Detailed Results

1. Creative Industries Scale, Scope and Employment

Indicator Definitions and Theory

The first sub-index is a familiar measurement of creative industries and services in terms of scale, scope and employment. There are three sub-levels to this category:

- Creative Industries Scale (CI-1: Creative Clusters)
- Creative Industries Scope (CI-1: Creative Clusters)
- Creative Industries Employment (CI-1: Creative Clusters; CI-2: Creative Services)

Creative Industries Scale comprises two measures: the size of the sector in economic terms (GDP) and the number of firms in the sector. These are indicators of *Creative Clusters* (CI-1 in the CCI creative cities model). The CI scale measure and also the employment measure below are both constructed in per capita terms.

The Creative Industries Scale classification is made over six categories (see Table 32 below, available at http://eprints.qut.edu.au/8242/1/8242.pdf), which reflects the CCI use of a pragmatic approach to identify the segments containing occupations and activities that are either closely related to each other or closely aligned in a production chain.

Table 32: The Activities Included Within CCI's Creative Segments Definition

SEGMENT AND SECTOR	SUB-SEGMENT	MAJOR ACTIVITIES
Music and Performing Arts	Music	Music Composition
		Music Performance
		Music Recording
		Music Composition Publishing
	Performing Arts	Performing Arts General
		Performing Arts Dance and Ballet
		Performing Arts Drama
		Performing Arts Venues
		Performing Arts Opera
Film, TV and Radio	Radio	Radio Program Production
	Film and TV	Film Production
		Film Special Effects Post Production
		Film Scriptwriting
		TV Broadcasting
		Film and Video Libraries
Advertising and Marketing	Services	Advertising Services
		Marketing Services
		Advertising Media
Software and Interactive Content	Software	Software Development
		Software Product Publishing
	Interactive Content	Multimedia Internet Development
		Interactive and Online Games Development

		Interactive Games Publishers
		Multimedia Internet Service Providers
		Multimedia Internet Content Publishing
Publishing	Publishing	Newspaper Publishing
		Periodicals Publishing
		Book Publishing
	Composition	Writing
		Libraries
Architecture, Design and Visual Arts	Design	Architecture
		Graphic Arts and Illustration
		Jewellery Design
		Fashion Design
		Interior Design
		Product Design
		Marine Architecture
		Other Specialised Design
	Visual Arts	Museums and Gallaries
		Visual Arts, Painters, Sculpters
		Photography

Creative Industries Scope as a measure of the creative city is unique among existing indexes. No other creative city indexes attempt to include this in their construction. We suggest that along with size, more creative cities are characterized by a more diverse creative sector in the sense of a greater balance of all creative sectors and tend not to be dominated by one particular sector (e.g. film-making).

Creative Industries scope focuses on diversity within the sector because of a long-run connection between diversity and growth. A creative global city is presumed to have a diverse industrial ecology in creative industries and we have sought to estimate that in our index construction. This alludes to the specialization vs. diversity debate in industrial and urban economics and we claim here, following the findings in that broader field, that diversity trumps specialization. The work of Harvard urban economist Edward Glaeser, among others, have found that over decades, industrial diversity contributes more to economic growth than specialization. Although we are not necessarily concerned with the impact of creative industry diversity/specialization on economic

growth, we are making the parallel argument that, over decades, creative diversity contributes more to creativity growth than specialization.

We use standard population diversity measurements. The Shannon index has been a popular diversity index in the ecological literature and estimates the proportional abundance of sub-sectors in the overall population of all creative industry firms. The Shannon index also measures the uncertainty involved in cultural clash, contestation and mixing: the more different sub-sectors or firms there are, and the more equal their proportional abundances in the greater creative industry of the city, the more difficult it is to correctly predict which firms or sub-industries will be encountered. The fragmentation index is another common population diversity measure that we have adapted here (with much the same interpretation). We take the average of these two diversity indexes as the measure of scope. While these are perhaps somewhat abstract index measures, we suggest that such diversity indexes capture both the **industrial resilience** of a creative city (a high diversity index associated with greater resilience through greater potential for growth along in any part of the sector) and also for greater potential for **recombinant growth** through new combinations of different parts of different sectors.

Creative Industries Employment comprises just the one measure: the number of people employed in the sector, which is then rescaled to a per-capita measure. This is an indicator of Creative Services (CI–2 in the CCI creative cities model). Note that we use per capita measures not absolute measures because we do not want to conflate general non-linear effects common to all cities (e.g. the benefits of larger population in cities such as London and Melbourne marked by higher aggregate CI output and employment) with the true local dynamics specific to each city, for example the effects of local events, historical contingency, or 'creative intensity' that are independent of population size.

Methodology and Data

The data can generally be found on the national level and are by now standardised. We transformed the data for Germany and the UK to fit the Australian standard of six categories. The data are generally available on the national level but not on the city level. However, the statistical authorities in Australia, Germany and the UK do also

collect these data on an urban scale and they should be made public in the near future. For instance, the German Ministry of Economics and Technology will publish these data for the bigger cities from June 2012 onwards. In order to estimate the size of the creative industries in one city we scaled the state data (or national in the case of Bremen) down to city size by using a conversion rate. In this case we used the OECD data on patents to establish the relationship 'patents from city/patents from entire state (or nation)'. This coefficient was then multiplied with the state data to get city-level data. This method was then applied consistently where we needed to transform national data to city data.

Scope is calculated with a Shannon's Diversity Index measure. This is a standard method for calculating a diversity index from a simple unbounded distribution. A higher result implies a more equally distributed share of each industry out of the total. Notably, this measure does not account for absolute scale differences across different cities, but only relative differences between sizes within a city. This index therefore works best when comparing cities of similar sizes. To obtain the diversity index measure the percentage of each industry out of the total creative industries is calculated. This share is then multiplied with the natural logarithm of itself. Finally, the sum of these numbers for every individual industry is then multiplied by negative one. The following formula demonstrates how a Shannon's Diversity Index is calculated:

$$Diversity = -\sum_{i=1}^{N} p_i \log p_i$$

Results and Discussion

The results are shown in the table below (Table 33). The analysis comes as no surprise – London has the biggest creative industries in all aspects. The following ranks are the same as the population rank, i.e. Melbourne comes second, Berlin third, etc. When it comes to the scope of the industries the picture looks different. Bremen and Berlin are the most diversified cities but the difference from other cities is not big. The structure however is not the same. Melbourne's number one industry is software followed by the publishing and print media. Berlin's music and performing arts industry is nearly four times that of Melbourne. Although Melbourne's creative industry is bigger, Berlin's is more diverse.

Table 33: Creative Industries Scale, Scope & Employment

1. CREATIVE INDUSTRIES SCALE, SCOPE & EMPLOYMENT	ω	BRI	MEL	BER	BRE	CAR	LON
1.1 Creative Industries Scale (CI-1: Creative Clusters)							
Size of the creative sector (in millions of dollars at PPP)							
Music & performing arts		77	154	574	37	37	1,854
Film, television & radio		254	785	483	59	111	3,533
Advertising & marketing		73	154	486	100	27	4,518
Software development & interactive content		865	2,298	683	105	36	15,292
Writing, publishing & print media		473	1,052	914	168	55	5,851
Architecture, design & visual arts		262	616	371	110	47	3,070
TOTAL CREATIVE INDUSTRIES		2,003	5,059	3,512	579	313	33,981
PER CAPITA		980.18	1,240.88	1,012.48	1,057.47	917.74	4,342.45
	1.0	22.6	28.6	23.3	24.4	21.1	100.0
Size of the creative sector (in number of firms)							
Music & performing arts		1,117	2,232	5,329	180	335	11,621
Film, television & radio		496	1,528	1,263	224	279	6,716
Advertising & marketing		1,164	2,465	2,183	230	419	5,584
Software development & interactive content		3,568	9,494	2,158	224	113	30,826
Writing, publishing & print media		389	867	1,732	314	64	2,905
Architecture, design & visual arts		4,001	9,405	4,967	628	508	10,036
TOTAL CREATIVE INDUSTRIES		10,735	25,990	17,632	1,800	1,718	67,688

PER 1,000 POPULATION		5.25	6.37	5.08	3.29	5.04	8.65
	1.0	15.9	38.4	26.0	2.7	2.5	100.0
1.2 Creative Industries Scope (CI-1: Creative Clusters)							
Diversity of the creative sector (taken of the above categories in millions of dollars at PPP)							
Fragmentation index (1 = diverse, 0 = homogenous)		0.72	0.71	0.82	0.80	0.79	0.73
	0.5	88.2	86.7	100.0	98.1	96.5	89.0
Shannon's diversity index (higher = more diverse)		1.48	1.44	1.75	1.70	1.67	1.54
	0.5	84.4	82.5	100.0	97.2	95.5	88.1
Diversity of the creative sector (taken of the above categories in number of firms)							
Fragmentation index (1 = diverse, 0 = homogenous)		0.72	0.71	0.78	0.79	0.78	0.72
	0.5	91.7	90.5	99.3	100.0	98.7	91.5
Shannon's diversity index (higher = more diverse)		1.47	1.45	1.65	1.68	1.62	1.51
	0.5	87.7	86.3	98.3	100.0	96.4	90.1
1.3 Creative Industries Employment (CI-1: Creative Clusters; CI-2: Creative Services)							
Number of people employed in creative sector							
Music & performing arts		2,869	7,452	11,523	746	1,122	115,380
Film, television & radio		5,291	13,742	11,948	933	2,178	75,084
Advertising & marketing		1,435	3,726	9,649	1,297	528	112,889
Software development & interactive content		15,965	41,466	16,693	2,483	726	284,110
Writing, publishing & print media		5,831	15,144	15,902	2,253	792	89,270

Architecture, design & visual arts	10,266	26,664	5,300	2,289	1,254	137,150
TOTAL CREATIVE INDUSTRIES	41,657	108,194	71,015	10,001	6,600	813,883
PER 1,000 POPULATION	20.39	26.54	20.47	18.27	19.35	104.01
1.0	19.6	25.5	19.7	17.6	18.6	100.0
CREATIVE INDUSTRIES SCALE, SCOPE & EMPLOYMENT SUB-INDEX	**49.8**	**54.4**	**53.4**	**49.2**	**51.7**	**96.6**

2. Microproductivity

Indicator Definitions and Theory

The second sub-index is another unique contribution of the CCI Creative City Index, 'microproductivity', which measures population-wide microproduction by creative citizens, virtual connectivity between agents, and local networks and interaction. There are three sub-levels to this category:

- 2.1 Population-wide Microproduction (CI-3: Creative Citizens)
- 2.2 Virtual Connectivity (CI-4: Creative Cities)
- 2.3 Local Networks and Interaction (CI-4: Creative Cities)

Population-wide Microproduction as a measure of the creative city is unique among existing indexes. No other creative city indexes attempt to include this in their construction (that we are aware of). This indicator of *Creative Citizens* (CI-3) is a key component of the CCI creative cities model, and we use various measures to capture it (as below). These metrics attempt to account for the importance – both economic and cultural – of user-created content and the burgeoning scale of computer-enabled social networks. We prefer to use actual production data (e.g. the amount of citizens' uploads to YouTube in London); however in the absence of such information we have used 'tagging' data from scaled-up micro-productive institutions (e.g. YouTube, Google) as an approximation.

Indicators we have used include:

- Number of video uploads to YouTube
    - The number of videos that arise from a search of the city name – i.e. 'London' – is used. We would have preferred geographical-based data to measure the number of videos actually uploaded by citizens from the city, but this data is mostly unavailable and we have had to suffice with "city-name tagging". While the number of videos is not necessarily an accurate measure of actual micro-production in the city, we believe that the relative incidence of tagging across cities should scale proportionally with actual micro-production.
- Number of music profiles uploaded on the Internet
    - Similarly we look at tagging data for music profiles on the Internet; we would prefer, ideally, the number of actual gigs and performances in each city by semi-professional/amateur artists in dive bars or on 'local nights' at music venues but we have sufficed with artist profiles on MySpace Music, Last.fm, and Bandcamp. We assume that the relative incidence of established and amateur artists on MySpace Music is consistent across cities, and users of these platforms are overwhelmingly local/semi-pro anyway. Bandcamp is a social media, marketing, and self-distribution tool explicitly for micro-productive agents. It is an online music store, as well as a platform for artist promotion, that caters mainly for independent artists, providing a customizable micro-site with the albums they upload. We believe these indicators, taken together, form an appropriate measure of music microproductivity.
- Image uploads/tags and blogs
    - A similar story to YouTube uploads/tags can be told for image uploads/tags and blogs (GoogleBlog search for city name).

A feature of microproductivity is that it is network-based. The next two sub-components measure microproductive networks – in virtual and real, physical spaces. When creativity reaches cultural dimensions located in cities, rather than being confined to production processes located in firms, the connections between culture and economy, individual talent and societal scale come into sharper focus. It is at this point that we must now take proper account of the growth of ICTs, digital media and the Internet, because these are now not simply in-company efficiency-technologies (as IT once was), but whole-of-society cultural forms (as the Internet now is). *Virtual Connectivity* comprises numerous measures to capture this aspect of the CCI creative cities model (CI-4: Creative Cities). It is about connectivity infrastructure or capability but also about virtual sites for social meeting and mixture, as well as friction.

Indicators we have used include:

- Number of personal computers as a percentage of total population
    - A city with greater incidence of PCs is more technologically equipped; citizens are prepared for micro-productive endeavours.
- Number of Internet and broadband users as a percentage of population
- Number of social networking users of most popular platform
    - We measure the number of Facebook profiles from each city. This does not necessarily tell us how many Facebook users there is in each city, but the incidence of people who hide their location and the incidence of people who have multiple profiles should be the same across all cities (even if this were not the case, it would be telling for the openness/quality of the "social network connectedness" in cities). We look at per capita measures (as a measure of relative intensity of virtual connectivity) but also the number of social network users in aggregate to capture clustering/network effects that are important to connectivity e.g. Metcalfe's law.
- Number of profiles that 'like' Pitchfork Media
    - In addition to the number of social network users we look at a niche sub-culture social network. Pitchfork Media, usually known simply as Pitchfork, is a Chicago-based daily Internet publication established in 1995 that is devoted to music criticism and commentary, music news, and artist interviews. Its focus is on underground and independent music, especially indie rock. It is a leading tastemaker/gatekeeper and has played a part in "breaking" artists (helping them scale up from microproducers, to indie artists, to established artists and even mainstream recognition). It is also a leading social signaling device of sorts for microproductive types. We also use per capita and aggregate measures here, to cover intensity and clustering.
- Number of professional networking users of most popular platform
    - Similar to social networks, we measure the number of LinkedIn profiles from each city, per capita and aggregate, as well as the self-identified subset of professional networkers from the creative industries, per capita and aggregate.)
- Other suggestions (not contained in this index pilot) include
    - Number of Wi-Fi subscribers per capita (or percentage of households with Wi-Fi connection); number of cell phone subscribers per capita; Internet activity of population (average time spent on Internet); number of Internet service providers (ISPs).

If Virtual Connectivity is the digital face of the creative city, then *Local Networks and Interaction* is its analogue or real-world counterpart (CI-4: Creative Cities in the CCI creative cities framework). It is about the local places and events that facilitate the associative structures and social networks, connections and human interactions that characterize creative cities e.g. *physical* sites for meeting, mixture, and friction.

Indicators we have used include:

- Number of festivals
    - Almost the archetypal example of local networks and interaction, festivals are a local events for performing/exhibiting creative output; an opportunity for mixing, clash and interaction; an attractant of citizens from fans/enthusiasts to micro-productive to fully-professional; a form of interactive/participatory sampling of culture/ creativity, mediating mixing, marketplace of ideas, and opportunity for social learning.
- Number of charity organizations
    - We suggest that charity organizations perform a similar participatory role within cities' local networks of interaction.
- Other suggestions (not contained in this index pilot) include
    - Urbanisation of city population (share of population living in densely-populated areas, i.e. as a measure of "clash"); number of event notices (e.g. "Timeout" index and gig guides); number of council-promoted cultural/community events, fairs, and festivals; amateur art and music competitions/performances/clubs; eisteddfods; number of media, organizations or events that cater for ethnic minority groups and foreign audiences (multicultural); number of media, organizations or events that are relevant to the GLBT community; clubs and associations; professional associations (Chamber of Commerce members); number of buskers/street performers (licenced); number of print publications that focus on news and lifestyle articles which are distributed for free within the streets of the city (street press); number of magazines and newspapers distributed in the city; number of radio and TV stations broadcast in the city.

Methodology and Data

The data for sections 2.1 and 2.2 are fairly easy to obtain through simple Internet research. It is important to take comparable statistics, i.e. British Facebook statistics are best of all compared to Renren Wang statistics in China. For this index we worked with 'tags' as they are easy to get and to compare. There is the risk that popular cities are tagged more often (e.g. by visitors) than less popular cities. On the other hand, it could mean that 'attractive' cities (as discussed in 4.3) generate more creativity. Better data could be obtained if the providers of Internet services could be contacted directly to supply actual uploading data from a given city and not merely tags. This is however a matter of dealing with the companies, which can take a considerable amount of time. Data about the accessibility to the Internet and the type of connection are usually published by statistical bureaus or local trade ministries.

We wanted to collect data on participation in associations (which may include democratic, cultural or health & welfare purposes), but Section 2.3 is possibly the hardest section to measure, as this kind of information is very different in every country. German cities for instance measure the number of people who are involved in some form of sporting association, but this information is not published in Australia. On the other hand, the Australian Bureau of Statistics reports on voluntary involvement and the number and amount of tax-deductible donations made by Australians, but one would search in vain for a German publication on this topic. Another issue is the non-availability of certain services in different countries. Meetup.com for instance is widely used in Anglo-American countries and all kinds of interest groups can organise activities. In Germany this website is not widely used and there is no counterpart that could be substituted for comparison. Another good measurement is the number of members of the local Chambers of Commerce; these however do not disclose such information. The ideal variables for section 2.3 would be the number of associations (split up according to different fields, i.e. sports, culture, business, charity, etc.) and their members as well as the number of activities organised by them (activities, fairs, tournaments, etc.).

Results and Discussion

London has the highest score, followed by Berlin and Melbourne. It is often tagged which has to do with the attractiveness of the city. Since many things happen in London it gets referenced a lot, which brings the 'tag' score upwards. Berlin being the German capital has the advantage of being often quoted while Melbourne, which is bigger than Berlin, does not have the capital-city benefit. Berlin is nonetheless more creative than Melbourne, which is remarkable for a city that has only three million people in comparison to nearly five million in Melbourne.

The virtual connectivity figures demonstrate a difficulty with cross-cultural comparisons. Germany has traditionally had several private and professional networking platforms. Therefore, the German market has been more fragmentised as its British and Australian counterpart. This biases the results downwards. The simple sum of different services cannot be taken since many users use several platforms and a mere aggregation would lead to double counting and overestimation.

Berlin has an important music scene and a vast number of associations that engage in the organisation of festivals. This explains why there are more activities there than in Melbourne, which has a significantly bigger population. Other cities like Brisbane, Berlin and Cardiff are dwarfed in comparison to these big cities, but it is not surprising that scale has its effect on the result.

Table 34: Microproductivity

2. MICRO-PRODUCTIVITY	ω	BRI	MEL	BER	BRE	CAR	LON
2.1 Population-wide Microproduction (CI-3: Creative Citizens)							
Number of videos uploaded to YouTube							
Per month		6,380	16,000	21,000	4,360	2,490	29,100
Per 1,000 population		3.12	3.92	6.05	7.96	7.30	3.72
	1.0	39.2	49.3	76.0	100.0	91.7	46.7
Anytime (number of videos currently available for viewing)		236,000	577,000	1,150,000	147,000	111,000	1,630,000
Per 1,000 population		115.51	141.52	331.52	268.48	325.46	208.30
	1.0	34.8	42.7	100.0	81.0	98.2	62.8
Number of music profiles uploaded on the Internet							
Number of artists, songs, albums, and music videos tagged with city name on Myspace Music		1,837	3,260	30,368	1,966	1,856	61,538
Number of taggers using city name in tag on Last.fm		317	856	4,847	262	272	3,934
Number of pages on Bandcamp with city tagged as location		60	212	182	6	26	527

TOTAL		2,214	4,328	35,397	2,234	2,154	65,999
PER 1,000 POPULATION		1.08	1.06	10.20	4.08	6.32	8.43
	1.0	10.6	10.4	100.0	40.0	61.9	82.7
Number of images uploaded to the Internet							
Google Images		4,630,000	4,630,000	6,510,000	1,370,000	10,200,000	82,300,000
Flickr		485,646	1,579,129	3,373,740	144,169	297,199	9,655,532
Picasa		225,014	274,703	324,673	163,439	161,360	390,859
Photobucket		32,067	75,580	121,614	6,321	18,433	534,032
TOTAL		5,372,727	6,559,412	10,330,027	1,683,929	10,676,992	92,880,423
PER CAPITA		2.63	1.61	2.98	3.08	31.31	11.87
	1.0	8.4	5.1	9.5	9.8	100.0	37.9
Number of blogs uploaded to the Internet (search blogs for tagged items)		19.1M	34.8M	71.7M	6.9M	15.0M	231.0M
Per capita		9.35	8.54	20.67	12.67	43.98	29.52
	1.0	21.3	19.4	47.0	28.8	100.0	67.1
2.2 Virtual Connectivity (CI-4: Creative Cities)							
Number of personal computers as a % of total population		89.03%	84.79%	77.00%	81.00%	63.10%	86.00%
	1.0	100.0	95.2	86.5	91.0	70.9	96.6
Number of Internet users as a % of total population		86.28%	83.65%	75.00%	75.00%	54.18%	78.39%
	1.0	100.0	97.0	86.9	86.9	62.8	90.9

Number of broadband users as a % of total population		68.13%	66.00%	77.00%	66.00%	45.00%	76.00%
	1.0	88.5	85.7	100.0	85.7	58.4	98.7
Number of social networking users (of most popular platform)							
Number of profiles		1,165,940	1,970,440	1,148,660	192,900	225,040	8,299,340
	0.5	14.0	23.7	13.8	2.3	2.7	100.0
Number of profiles as a % of total population		57.06%	48.33%	33.43%	35.20%	65.99%	59.51%
	0.5	86.5	73.2	50.6	53.3	100.0	90.2
Number of profiles that 'like' Pitchfork Media		320	880	780	40	100	2,560
	0.5	12.5	34.4	30.5	1.6	3.9	100.0
Proportion of profiles that 'like' Pitchfork Media		0.03%	0.04%	0.07%	0.02%	0.04%	0.03%
	0.5	40.4	65.8	100.0	29.5	65.4	45.4
Number of professional networking users (of most popular platform)							
Number of profiles		170,336	334,798	100,647	15,907	32,250	1,257,430
	0.5	13.5	26.6	8.0	1.3	2.6	100.0
Number of profiles as a % of total population		8.34%	8.21%	2.93%	2.91%	9.46%	9.02%
	0.5	88.2	86.8	31.0	30.8	100.0	95.3
Number of profiles filtered by creative industries		22,767	57,176	33,777	2,450	4,578	320,117
	0.5	7.1	17.9	10.6	0.8	1.4	100.0

Proportion of profiles filtered by creative industries		13.37%	17.08%	33.56%	15.40%	14.20%	25.46%
	0.5	39.8	50.9	100.0	45.9	42.3	75.9
2.3 Local Networks and Interaction (CI-4: Creative Cities)							
Number of charity organizations per 1,000 people		0.01	0.02	0.02	0.01	0.01	0.10
	1.0	13.3	16.5	16.4	9.7	11.4	100.0
Number of festivals		75	100	122	45	6	200
	1.0	37.5	50.0	61.0	22.5	3.0	100.0
MICROPRODUCTIVITY SUB-INDEX		**37.0**	**41.8**	**53.6**	**39.2**	**49.2**	**83.6**

3. Attractions and Economy of Attention

Indicator Definitions and Theory

The third sub-index comprises familiar measurements of creative infrastructure and attractions. However it also includes indicators relating to the 'economy of attention' (Lanham 2006) that surrounds a city. There are two sub-levels to this category:

- 3.1 Creative Attractions
- 3.2 Economy of Attention

Creative Attractions contains various indicators, most of which are straightforward. These range from tourist attractions and 'things to do' to the number of concert halls and radio stations. We also highlight the importance of great cities as 'zones of attraction'. In this sense causes of city growth are the outcome of the choices of a mobile elite of smart global citizens. The issue then becomes how to attract such great people. This of course means that cities compete, and *Economy of Attention* indicators are one way of measuring which cities have a more visible 'buzz' to them and advantageous cultural pull factors.

Unlike scale and scope measures in dimension 1 above, which were transformed to a per capita index to eliminate pure scale effects, creative attractions and economy of attention is not transformed in that way but remains as an absolute measure of a city's attractions and the attention that it receives. Here we are explicitly interested in the full-scaled appeal of the city: cities compete for internationally mobile, creative citizens, and they compete of size, on the aggregate picture of attractiveness.

Economy of attention is quite similar to the "city name tagging" measurements in Microproductivity, however it is different in the sense that these indicators are more about promotion of the city and often originate from more "traditional", professional creative industry sources (rather than microproduction from the network, pro-production from firms). These indicators are thus about the likelihood of a person encountering a city in popular culture; the general buzz around a city, and how likely you are to hear about or to know something about the city.

Indicators we have used include:

- Creative attractions: number of top retailers, hotels, cinemas, theatres, museums, libraries, etc.
- Economy of attention: number of pages in Lonely Planet guides; number of words in Wikipedia entry; Google Trends index score (2010); frequency of city name appearing in published books (English corpus); number of items in iTunes catalogue; number of items in IMDB (Internet movie database); number of items in Amazon catalogue.
- Other suggestions (not contained in this index pilot) include
    - Creative attractions: number of pubs, bars and restaurants (number of liquor licenses issued).

Methodology and Data

As can be seen, the vast majority of variables can be searched on the respective websites. The number of hotel rooms and cinemas, if not available from the statistical authorities, can be easily researched through specialised websites. The city council websites offer comprehensive lists of art theatres, museums, concert halls and libraries. Libraries can otherwise also be searched for in the statistics of the national library

associations. CB Richard Ellis Global Research publishes the number of top retailers in a city.

Results and Discussion

London attracts most attention, followed by Berlin, Melbourne, Brisbane, Bremen and Cardiff. Melbourne has a bigger infrastructure but Berlin manages to receive more attention in publishing, almost certainly because of its record as a pivotal point in European history. It seems that more tourists come to the fairly central European city, as it is more accessible than the city at the southern tip of the Australian continent, thus more hotel rooms are available in Berlin. It is noteworthy that Berlin has most cinemas of all but that their size is small. Small cinemas are more likely to show independent movies than big cinemas that can only fill their seats with blockbusters. Small cinemas are also likelier to show local productions. The same principle seems to count for the number of live venues, concert halls and performing art theatres.

Table 35: Attractions & Economy of Attention

3. ATTRACTIONS & ECONOMY OF ATTENTION	ω	BRI	MEL	BER	BRE	CAR	LON
3.1 Creative Attractions							
Lonely Planet's "All Things to Do" (= Entertainment + Shopping + Tours + Activities + Restaurants + Sights)		183	751	815	50	105	1,428
	1.0	12.8	52.6	57.1	3.5	7.4	100.0
Proportion of the world's top retailers located in the city		15.40%	23.00%	37.20%	25.10%	22.40%	56.00%
	0.5	27.5	41.1	66.4	44.8	40.0	100.0
Retail rental value per square foot per annum (at PPP)		436.00	400.10	454.42	482.23	456.00	2,024.99
	0.5	21.5	19.8	22.4	23.8	22.5	100.0
Number of hotels		124	194	750	87	58	823

	1.0	15.1	23.6	91.1	10.6	7.0	100.0
Number of cinema theatres		57	68	274	8	5	105
	0.5	20.8	24.8	100.0	2.9	1.8	38.3
Number of cinema seats		55,628	69,460	54,421	10,215	6,172	129,609
	0.5	42.9	53.6	42.0	7.9	4.8	100.0
Number of performing arts theatres, concert halls and live music venues		47	131	294	13	24	464
	1.0	10.1	28.2	63.4	2.8	5.2	100.0
Number of museums		16	59	129	27	5	184
	1.0	8.7	32.1	70.1	14.7	2.7	100.0
Number of libraries		92	127	88	22	20	395
	1.0	23.3	32.2	22.3	5.6	5.1	100.0
3.2 Economy of Attention							
Number of pages in Lonely Planet guides		64	194	296	14	18	420
	1.0	15.2	46.2	70.5	3.3	4.3	100.0
Number of words in Wikipedia entry		9,040	13,393	13,533	12,880	11,841	16,875
	1.0	53.6	79.4	80.2	76.3	70.2	100.0
Google Trends index score (2010)		0.12	0.25	0.57	0.08	0.06	1.00
	0.5	12.0	25.0	57.0	8.0	6.0	100.0
Google Trends index score (cumulative to 2010)		0.10	0.20	0.52	0.08	0.06	1.00
	0.5	10.0	20.0	52.0	8.0	6.0	100.0
Frequency of city name appearing in published books (English corpus)		0.0001%	0.0006%	0.0029%	0.0001%	0.0002%	0.0185%

1.0	0.8	3.2	15.7	0.5	0.9	100.0
Number of items in iTunes catalogue						
Songs	428	1,688	8,467	1,773	673	8,603
iPod apps	130	293	559	113	63	1,368
iPad apps	39	68	178	37	21	393
Books	3	105	149	15	11	431
Audiobooks	0	4	141	11	2	348
Podcast episodes	1,593	3,848	8,004	239	220	8,005
iTunes U episodes	61	530	334	3	6	5,507
TOTAL ITEMS	2,254	6,536	17,832	2,191	996	24,655
1.0	9.1	26.5	72.3	8.9	4.0	100.0
Number of items in IMDB						
Films with city in plot	38	203	868	14	39	3,428
Films with city as filming location	295	1,470	4,428	139	223	9,290
TOTAL ITEMS	333	1,673	5,296	153	262	12,718
1.0	2.6	13.2	41.6	1.2	2.1	100.0
Number of items in Amazon catalogue						
Books	1,793	8,704	51,403	3,959	2,575	366,994
Kindle editions	39	152	628	22	30	2,256
eBooks (HTML & PDF)	61	261	475	17	28	1,811
TOTAL ITEMS	1,893	9,117	52,506	3,998	2,633	371,061
1.0	0.5	2.5	14.2	1.1	0.7	100.0
ATTRACTIONS & ECONOMY OF ATTENTION SUB-INDEX	**15.7**	**30.8**	**54.9**	**12.6**	**10.7**	**97.8**

4. Participation and Expenditure

Indicator Definitions and Theory

Cultural Participation is perhaps the most straightforward sub-index. It contains two sub-levels:

- 4.1 Attendance
- 4.2 Expenditure

These are about support for the creative industries and culture from citizens (as opposed to the government) in the form of attendance (patronage, involvement) and expenditure. The number of admissions to selected cultural events measures *Attendance* and annual household expenditure on arts and culture measures *Expenditure*.

Methodology and Data

Participation and expenditure data are as hard to find as 'microproductivity' data. Many of the following numbers are simply not recorded. The authorities of Berlin, London and the Australian states offer reasonably useful numbers on participation, but Bremen and Cardiff and the individual Australian cities publish barely anything on this. Alternative sources of information are the relevant venues themselves although they often do not record these statistics either and for bigger cities this becomes a very tedious task. Household expenditure data can usually be found in statistical yearbooks for countries and eventually states but does usually not exist for smaller cities as it is hard to measure and very few people are willing to participate in these kinds of surveys. In this case only the state or national level data can serve as an approximation.

Results and Discussion

Most participants in cultural events can be found in London, followed by Berlin and Melbourne. The difference between Berlin and Melbourne becomes particularly apparent here. The participation at 'Total GLAM' is effectively biased against Berlin, because only the numbers attending museums could be found, while all kinds of attendance (i.e. GLA as well as M) could be found for London and Melbourne. If the attendance at libraries, galleries and archives was added for Berlin, the difference would be even greater. Looking at the share of the expenditure on arts out of total household expenditure the

picture becomes clear. Cultural activities in Berlin are cheap in comparison to other cities. Furthermore the living expenses in general are low, so a bigger proportion of income may be dedicated to culture and arts. The same is true for Bremen, where many participation statistics could not be found and the city is thus undervalued.

Table 36: Participation & Expenditure

4. PARTICIPATION & EXPENDITURE	ω	BRI	MEL	BER	BRE	CAR	LON
4.1 Attendance							
Number of admissions to selected cultural events							
Art galleries		587,005	763,627	–	–	22,049	1,404,819
Libraries		783,005	940,268	–	–	2,057,392	4,131,820
Archives		49,019	124,857	–	–	–	525,868
Museums		583,616	745,072	–	–	268,966	3,155,208
TOTAL GLAM		2,002,645	2,573,824	13,335,000	1,354,000	2,348,407	9,217,715
	1.0	15.0	19.3	100.0	10.2	17.6	69.1
Classical music concert		158,279	318,449	990,731	–	64,790	570,942
Theatre		327,038	519,405	905,874	–	122,760	1,878,100
Dance performances		208,907	274,666	25,000	–	30,690	330,546
Musicals and operas		324,815	634,613	714,606	–	34,100	1,765,414
Other performing arts		555,400	796,600	252,011	–	78,430	961,587
TOTAL PERFORMING ARTS		1,574,439	2,543,733	2,888,222	459,128	330,770	5,506,589
	1.0	28.6	46.2	52.5	8.3	6.0	100.0
Cinema		1,534,025	1,964,166	9,522,000	178,731	27,280	39,800,000
	1.0	3.9	4.9	23.9	0.4	0.1	100.0

Popular music concert		637,463	904,269	1,500,000	300,000	51,150	2,253,720
	1.0	28.3	40.1	66.6	13.3	2.3	100.0
AT LEAST ONE CULTURAL EVENT		1,925,182	2,461,255	4,000,000	800,000	296,670	5,686,887
	1.0	33.9	43.3	70.3	14.1	5.2	100.0
4.2 Expenditure							
Household expenditure on arts and culture (in dollars at PPP)		1,663	1,663	1,991	2,673	2,035	2,187
	1.0	62.2	62.2	74.5	100.0	76.1	81.8
Household expenditure on arts and culture as a percentage of total expenditure per household		3.98%	3.98%	7.40%	9.45%	5.90%	4.70%
	1.0	42.1	42.1	78.3	100.0	62.4	49.7
PARTICIPATION & EXPENDITURE SUB-INDEX		**37.0**	**41.5**	**69.5**	**54.6**	**37.8**	**79.8**

5. Public Support

Indicator Definitions and Theory

This sub-index measures public support at each level of government in terms of:

- 5.1 Expenditure

Again, this section contains very straightforward measurement of the amount of cultural funding per person by level of government. We might also like to look at the proportions of the local city government budgets that are devoted to creativity and cultural funding and ICT funding as an alternative indicator.

Methodology and Data

Government budget reports at national, state and local level are the obvious source for this measure. Unfortunately it can be challenging properly to disentangle all statements and to properly attribute expenditures to either mere bureaucracy payments or real investment in culture. The budget of the ministry of culture is generally a good approximation. This section would also include 'government expenditure on creative industries' if it had proven possible to attribute the payments to these industries.

An alternative measure of public support could be the proportion of local city government expenditure on arts, culture and creative industries (spend on culture, arts and creative industries/total spend). This would measure the relative importance place on cultural expenditure in government budget. This was difficult to quantify across the various levels of government; future effort could be put on refining this as an indicator.

Results and Discussion

The range of spending on culture and arts per capita is rather narrow, with Brisbane and London spending the most. Cardiff is unfortunately biased downwards because the local government's expenditure could not be found.

Table 37: Public Support

5. PUBLIC SUPPORT	ω	BRI	MEL	BER	BRE	CAR	LON
5.1 Expenditure							
Cultural and arts funding per person by level of government (in dollars at PPP)							
Federal		82.56	82.56	16.45	16.45	144.15	144.15
State		113.80	70.13	166.68	171.43	18.18	79.63
Local		40.59	37.14	–	–	–	–
Total		236.95	189.83	183.13	187.88	162.33	223.78
	1.0	100.0	80.1	77.3	79.3	68.5	94.4
PUBLIC SUPPORT SUB-INDEX		**100.0**	**80.1**	**77.3**	**79.3**	**68.5**	**94.4**

6. Human Capital and Research

Indicator Definitions and Theory

The next sub-index is another reasonably familiar measurement of R&D employment, education and human capital, and research capacity. There are three sub-levels to this category:

- 6.1 Employment
- 6.2 Education
- 6.3 Research and Development

The first indicator is simply the number of people employed in R&D. Education indicators are common to the city index literature; ours includes the number of students, graduates and education institutions. Finally, research is measured in the standard way used in other indexes by the number of patents issued and R&D expenditure.

A key part of our conception of a creative city is youth and population dynamics – the growing importance of youth. There is an obvious overlap between the youth/student and microproductive demographics: students are often willing agents of risk and uncertainty, operating as both producers and consumers of experimentation and novelty in social-networks of cultural entrepreneurship and consumer creativity. This is the very definition of microproducers.

Moreover, as a manifestation or symptom of the gap between "elite" arts producers and consumers and "microproducers/consumer-creators", youth is often under-recognised in much contemporary policy work, which tends to cater for an older demographic. By measuring the number of higher education students as a promoter of the creative city we hope to restoring some balance to creative city policy landscape: from elite producers (older demographic) to microproducers (student demographic). Besides, it is also important to have a vibrant student population from a purely educational and human capital perspective.

Methodology and Data

National and state level statistics are generally a good and reliable source concerning education (6.2). Occasionally some of the big panel surveys from social research projects can help find statistics for individual cities. Section 6.1 on employment and section 6.3 on research and development are best of all taken from the Organisation for Economic Co-operation and Development (OECD).

Results and Discussion

Since all six cities are in industrialised countries the difference between the cities is not as big as in other sub-indexes. London has the highest index figure as it is home to many corporate and public research centres. Also the vast number of students and the facilities give it an advantage of scale. Berlin is again ahead of Melbourne as it can compensate the disadvantage in scale with better relative factors. It is interesting to notice that Berlin outperforms London in 'number of patents' and its per capita value. Bremen is slightly ahead of Brisbane and Cardiff comes last, despite its sizeable student population. It is interesting to notice that the German cities have the lowest number of university graduates out of the total population ratio while they have the highest proportion of qualified people. For the UK the opposite is the case. This could have to do with different alternative training programs like apprenticeships, which are fairly well established in Germany and Australia.

Table 38: Human Capital & Research

6. HUMAN CAPITAL & RESEARCH	ω	BRI	MEL	BER	BRE	CAR	LON
6.1 Employment							
Employment in R&D as % of total employment (business sector, government and higher education)		0.57%	0.64%	2.77%	2.68%	1.48%	2.23%
	1.0	20.6	23.1	100.0	96.8	53.4	80.5
6.2 Education							

Number of qualified people as a % of total population		56.40%	57.90%	63.49%	60.70%	51.00%	56.45%
	1.0	88.8	91.2	100.0	95.6	80.3	88.9
Number of university graduates (Bachelor degree or higher) as a % of total population		26.67%	23.22%	19.34%	14.60%	32.30%	28.00%
	1.0	82.6	71.9	59.9	45.2	100.0	86.7
Number of higher education students		124,102	301,962	147,030	31,573	50,430	433,000
	0.5	28.7	69.7	34.0	7.3	11.6	100.0
Number of higher education students as a % of total population		6.07%	7.41%	4.28%	5.80%	14.79%	5.53%
	0.5	41.1	50.1	28.9	39.2	100.0	37.4
Number of places of higher education (i.e. universities, colleges, institutes)		4	9	11	8	4	68
	1.0	5.9	13.2	16.2	11.8	5.9	100.0
Number of places of cultural higher education (i.e. film school)		1	3	2	0	0	11
	1.0	9.1	27.3	18.2	0.0	0.0	100.0
6.3 Research and Development							
Number of patents issued per capita		0.000082	0.000103	0.000202	0.000099	0.000147	0.000088
	1.0	40.6	51.0	100.0	49.0	72.6	43.7

R&D expenditure (in millions of dollars at PPP)							
Business sector		2,222	3,490	1,164	196	490	1,658
Government		293	563	1,296	328	60	595
Higher education		942	1,583	1,011	178	544	3,386
TOTAL R&D EXPENDITURE		3,456	5,636	3,472	702	1,094	5,639
	0.5	61.3	99.9	61.6	12.4	19.4	100.0
R&D expenditure (in dollars at PPP) per capita		1,691.51	1,382.46	1,010.20	325.00	522.00	720.65
	0.5	100.0	81.7	59.7	19.2	30.9	42.6
HUMAN CAPITAL & RESEARCH SUB-INDEX		**41.8**	**48.9**	**75.2**	**54.8**	**50.2**	**75.6**

7. Global Integration

Indicator Definitions and Theory

This sub-index measures global integration in terms of:

- 7.1 International Airport Traffic
- 7.2 Flows of People
- 7.3 Globalization

We have highlighted the shift towards the modern globalised and entirely dynamic view of great cities as zones of attraction. This view emphasizes the role of cities as international hubs, or nodes that mediate local networks with global networks and connectedness. There is a focus on growth focused transport networks, international air connectivity and the cultivation of 'aerotropolis' cities. *Flows of People* is measured by net overseas and interstate migration, and population turnover by migration (total flows/population). *Globalization* is measured as well – the most well known of these indicators is the Globalization and World Cities (GaWC) group ranking.

Clearly international airport traffic is a key part of global integration. Indicators we have used include:

- Number of international flights, number of international passengers, international freight (tonnes), and number of cities linked by direct international flights are standard indicators
- Travel distance between inner city and airport (km) and travel time between inner city and airport (minutes)
    - Included to measure the infrastructure of the city, linkages, etc. that makes the city amenable to international airport traffic. A city that has close, easy and timely access to its international airport from the downtown district is comparatively more integrated.

The sub-component measuring flows of people based on the premise that cities compete for 'factors of production' i.e. in effect, people and capital. Creative cities compete for the creative class and we have outlined some attractions and the economy of attention involved in this process; however, another point is that the creative city itself is an attractant of creative people (indeed that is *the* point of the CCI-CCI). We want to measure the extent to which this population turnover and flux occurs not only as an output of the creative city (effect) but also as an input (cause). That is, we make the claim that people are attracted to places in flux.

Indicators we have used include:

- Total migration (net)
    - This tracks the extent to which the city is growing in population. While gross migration is potentially illuminating e.g. a city may have a small positive net migration but with massive inflows and outflows of people – i.e. flux – net migration is a measure of city population growth and hence an indicator of the success or otherwise of a city in actually attracting and holding onto mobile creative citizens (i.e. an output of creative cities, an effect).
- Population turnover (total migration (gross) divided by total population)
    - This is the proportion of the city's population that is turned over in a year, and is the ideal measure of population flux (as opposed to simply gross migration). As a measure of flux and this is actually an indicator of an attractant in the competition for mobile creative citizens. It is also a source of clash, contestation, etc. (i.e. an input to creative cities, a cause).

Globalization is measured by two indicators from the GaWC group. GaWc's research network focuses upon the external relations of world cities as opposed to simply studying the internal structures of individual cities and comparative analyses of the same. These indicators are based on the network of business relations between the world's largest law, financial services, advertising and accountancy firms. GaWc globalization indicator is based on the ranking and classification of world cities given by GaWC whereas the number of "connectives" is the actual number of connections between firms in the cities.

Methodology and Data

International airport traffic statistics are available from virtually every airport authority, whose statistics are usually quite comprehensive. Most state-level statistical yearbooks have a section on interstate and overseas migration, although these could be reduced to only net values. To deduce city data the in- and outflows show be scaled by population size. The GaWC Globalization Index has 12 categories of cities. Depending on which category the city is in it receives this score, which then merely needs to be scaled into a percentage.

Results and Discussion

This subcategory mostly depends on aggregate statistics. Thus it is not surprising that bigger cities will have a higher score. London again leads, followed by Melbourne, Berlin, Brisbane, Bremen and Cardiff. Berlin does better than Melbourne when it comes to international flights and passengers, but this is because Germany is much smaller than Australia and has more direct neighbours. Cardiff has the highest population turnover due to its big student population who come for studies and leave again after graduation.

Table 39: Global Integration

7. GLOBAL INTEGRATION	ω	BRI	MEL	BER	BRE	CAR	LON
7.1 International Airport Traffic							
Number of international flights		27,002	31,909	218,200	35,739	9,261	375,944
	1.0	7.2	8.5	58.0	9.5	2.5	100.0
Number of international passengers		4,282,458	5,872,602	12,860,429	124,125	1,133,290	115,610,443
	1.0	3.7	5.1	11.1	0.1	1.0	100.0
International freight (tonnes)		95,351	216,869	19,678	21,563	38	1,470,504
	1.0	6.5	14.7	1.3	1.5	0.0	100.0
Number of cities linked by direct international flights		76	69	171	27	44	176
	1.0	43.2	39.2	97.2	15.3	25.0	100.0
Travel distance between inner city and airport (km)		15	24	12	6	21	27
	1.0	40.0	25.0	50.0	100.0	28.6	22.2
Travel time between inner city and airport (minutes)		21	23	22	13	35	32
	1.0	61.9	56.5	59.1	100.0	37.1	40.6
7.2 Flow of People							
Total migration							
Arrivals		108,913	161,801	147,769	31,446	27,858	604,785
Departures		78,378	102,436	130,951	30,555	24,750	601,227
NET TOTAL MIGRATION		30,536	59,365	16,818	891	3,108	3,558

	1.0	51.4	100.0	28.3	1.5	5.2	6.0
Population turnover							
From overseas migration		4.22%	3.75%	3.51%	3.76%	3.13%	3.50%
From interstate migration		4.95%	2.73%	4.60%	7.56%	12.30%	11.91%
FROM TOTAL MIGRATION		9.17%	6.48%	8.11%	11.32%	15.42%	15.41%
	1.0	59.4	42.0	52.6	73.4	100.0	99.9
7.3 Globalization							
GaWC globalization		50	75	67	8	8	100
	1.0	50.0	75.0	66.7	8.3	8.3	100.0
Number of "connectives" (GaWC specification of the World City Network)		17,537	29,599	23,035	6,989	4,900	63,354
	1.0	27.7	46.7	36.4	11.0	7.7	100.0
GLOBAL INTEGRATION SUB-INDEX		**40.5**	**52.2**	**46.0**	**28.3**	**25.4**	**76.7**

8. Openness, Tolerance and Diversity

Indicator Definitions and Theory

The final sub-index – *Openness, Tolerance & Diversity* – is very common to the creative cities index literature, as popularized by the work of Richard Florida. There are three sub-levels to this category:

- 8.1 Openness and Tolerance
- 8.2 Diversity and Demographics
- 8.3 Civic Engagement

The indicators below can be used to measure how open a society is, with respect to either outsiders, or dissenting opinions and practices. A more open society is believed to be more conducive to creativity. The standard indicator of openness, tolerance and

diversity is the 'gay index' – the number of persons in same sex couples as proportion all persons in couples, relative to national average. We have extended our analysis of diversity to include not only 'sexual', but also 'spiritual' and 'ethnic' diversity (i.e. using fragmentation and diversity indexes), as well as including measures of youth population dynamics and income equality. Also, within the global creative city literature civic engagement is also thought to be conducive to creativity.

Indicators we have used include:

- Proportion of marriages that end in divorce
    - Women's freedom, and the extent to which subversion of a strong conservative cultural norm is tolerated.
- Censorship/freedom of press
- 'Population of concern' residents per capita (e.g. refugees, asylum seekers) and number of visas granted to refugees and asylum seekers per capita
    - Indicators of openness to minority groups.
- Sexual openness
    - Measured by (equally weighted) the share of registered gay partnerships as a proportion of total partnerships of the city and the share of registered gay partnerships as a proportion of total partnerships of the city, relative to national share. The second indicator (relative to national average) tells you "how gay the city is relative to the rest of the country i.e. if the city is a gay hotspot. This is an important distinction as it standardises the indicator to account for cultural differences among nations.
- Religious openness
    - Measured by the number of people in the population with no religion and the proportion of the population with no religion. Quite simply this is the tolerance of and freedom to opt out of the dominant religion (or more so religion altogether).
- Nationality openness (by birthplace)
    - Measured by the number of people in the population not born in the country and the proportion of the population not born in the country. Again, this is about the tolerance of the majority population for minority groups. It is also important for reasons outlined earlier about clash, contestation, and population flux.
- Religious diversity and nationality diversity (by birthplace)
    - The diversity measures used are the same as previously discussed (diversity of creative industries). Shannon's index and the fragmentation index estimate the proportional representation of religions and nationalities in the overall population of citizens. Thus they measures the uncertainty involved in cultural clash, contestation and mixing: the more different types religions/nationalities there are, and the more equal their

proportional representation in the greater population, the more difficult it is to correctly predict the religion or nationality of people encountered in the street.

- Demographics: youth populations (number of people aged 15-24, proportion of people aged 15-24, and number of foreign higher education students) and income inequality (Gini index)
    - The Number of foreign higher education students is quite a nice indicator here since it marries openness, diversity and youth.
- Civic engagement: voter participation (proportion of eligible voters and relative to level of national participation rate) and corruption
    - A more open society is more engaged. This is also related to tolerance and social networks and interaction: poor civic engagement frustrates social networks and interaction.

Methodology and Data

Every statistical yearbook should contain most information needed for this index. Numbers on refugees are available with the United Nations High Commissioner for Refugees (UNHCR) or the ministry of interior and immigration. The reporters without borders Freedom of Press Index is available for the national level. Corruption figures are taken from the Corruption Perception Index by Transparency International. Voter participation is made public by the election committee. The Gini coefficient is often not published but numbers on income inequality are, from which the Gini index can be estimated. The only figure that is unreliable is the sexual openness indicator. In countries with registered same sex partnerships the figure is strongly underestimated since non-register same sex partnerships are not accounted for. Australia's Bureau of Statistics published a different number that is even less reliable as the estimation method is wrong (e.g. two housemates of the same gender who respond that they are in a relationship are thus counted as homosexual). However, in the absence of a better measure we need to resort to this number. The diversity measure for religion and nationality is again calculated according to Shannon's Diversity Index:

$$Diversity = -\sum_{i=1}^{N} p_i \log p_i$$

Results and Discussion

The results are mixed here, although they may be plausible. The difference between Cardiff (60.8) and Melbourne (76.3) is not large. Looking at section 8.1, Berlin seems to be more tolerant than other cities. The high rate of people without religion is probably

due to the socialist heritage as well as the need to pay extra taxes when registered with the Christian churches. Australia and the UK have a longer history of naturalising immigrants and thus score well on the nationality openness score. Nonetheless, Cardiff only recently started to attract more foreigners as can be seen in 2.2. As a prominent student city, Cardiff has the highest proportion of young people, who tend to move away after finishing their studies and thus cause strong population turnover. German cities on the other hand suffer from the aging of society, where especially Australia looks better. In terms of income inequality Berlin performs best, which is again due to its socialist heritage and its comparably low-income level. Cardiff on the other hand has a lot of students who do not earn income and thus increase measured income inequality. The results for civic engagement are similar, which is not surprising for developed countries.

Table 40: Openness, Tolerance & Diversity

8. OPENNESS, TOLERANCE & DIVERSITY	ω	BRI	MEL	BER	BRE	CAR	LON
8.1 Openness and Tolerance							
Proportion of marriages that end in divorce		16.92%	14.26%	18.02%	15.71%	9.89%	10.34%
	1.0	93.9	79.1	100.0	87.2	54.9	57.4
Censorship/freedom of press		5.38	5.38	4.25	4.25	6.00	6.00
	1.0	79.0	79.0	100.0	100.0	70.8	70.8
'Population of concern' residents per capita (e.g. refugees, asylum seekers)		0.0011	0.0011	0.0082	0.0049	0.0030	0.0041
	1.0	14.0	14.0	100.0	59.7	36.8	49.6
Number of visas granted to refugees and asylum seekers per capita		0.0006	0.0006	0.0032	0.0019	0.0251	0.0008
	1.0	2.5	2.5	12.8	7.6	100.0	3.2

Sexual Openness							
Share of registered gay partnerships as a proportion of total partnerships of the city		0.73%	0.81%	2.20%	4.70%	4.78%	0.92%
	0.5	15.3	17.0	46.0	98.3	100.0	19.2
Share of registered gay partnerships as a proportion of total partnerships of the city, relative to national share		1.09	1.22	1.47	15.60	1.72	3.07
	0.5	7.0	7.8	9.4	100.0	11.0	19.7
Religious Openness							
Number of people in the population with no religion		438,322	925,547	2,088,361	240,367	57,440	1,486,788
	0.5	21.0	44.3	100.0	11.5	2.8	71.2
Proportion of the population with no religion		21.45%	22.70%	60.77%	43.90%	18.81%	19.00%
	0.5	35.3	37.4	100.0	72.2	31.0	31.3
Nationality openness (by birthplace)							
Number of people in the population not born in the country		600,492	1,512,173	836,100	144,001	21,186	2,660,568
	0.5	22.6	56.8	31.4	5.4	0.8	100.0
Proportion of the population not born in the country		29.39%	37.09%	24.33%	26.30%	6.94%	34.00%
	0.5	79.2	100.0	65.6	70.9	18.7	91.7
8.2 Diversity and Demographics							
Religious diversity							

Fragmentation index (1 = diverse, 0 = homogenous)		0.40	0.50	0.53	0.6	0.42	0.63
	0.5	64.0	79.3	83.7	95.4	66.8	100.0
Shannon's diversity index (higher=more diverse)		0.74	0.99	0.89	1.19	0.79	1.31
	0.5	56.9	75.7	67.9	91.0	60.4	100.0
Nationality diversity (by birthplace)							
Fragmentation index using 10 largest ethnic cohorts (1 = diverse, 0 = homogenous)		0.50	0.60	0.25	0.23	0.1	0.55
	0.5	82.6	100.0	41.2	38.3	16.6	91.8
Shannon's diversity index using 10 largest ethnic cohorts (higher = more diverse)		0.75	0.90	0.43	0.41	0.3	0.71
	0.5	83.6	100.0	48.5	45.7	33.4	79.5
Youth population							
Number of people aged 15-24		289,714	575,947	367,706	77,414	50,261	1,050,142
	0.5	27.6	54.8	35.0	7.4	4.8	100.0
Proportion of people aged 15-24		14.18%	14.13%	10.70%	11.72%	16.46%	13.42%
	0.5	86.1	85.8	65.0	71.2	100.0	81.5
Number of foreign higher education students		56,971	155,233	23,952	4,731	24,030	99,360
	1.0	36.7	100.0	15.4	3.0	15.5	64.0
Income inequality (Gini co.)		0.35	0.35	0.30	0.31	0.34	0.33
	1.0	85.7	85.7	100.0	96.8	88.2	92.3

8.3 Civic Engagement							
Voter participation at last nation-wide election (proportion of eligible voters)		91.35%	90.09%	70.90%	70.30%	62.73%	64.50%
	1.0	100.0	98.6	77.6	77.0	68.7	70.6
Voter participation at last nation-wide election relative to national rate		0.98	0.97	1.00	0.994	96.36%	0.99
	1.0	97.8	96.5	100.0	99.2	96.2	98.9
Corruption index		8.7	8.7	7.9	7.9	7.6	7.6
	1.0	100.0	100.0	90.8	90.8	87.4	87.4
OPENNESS, TOLERANCE & DIVERSITY SUB-INDEX		**67.5**	**76.0**	**74.0**	**70.5**	**63.6**	**76.5**

5. Conclusions

5.1 Summary of Index and Findings

The proposal for a new type of index – which we have delivered here as the CCI Creative City Index or CCI-CCI – is based upon recognition of the strengths of existing creative and global city indexes. It seeks to maintain the useful and effective elements of those measures, while also acknowledging and seeking to correct their weaknesses.

The strengths of the extant indexes – including Richard Florida's creative city index, the MORI index, the GaWC index, Landry's creative city index, and others – revolve about measurement of creative city attractions, infrastructure, research and human capital, public support for arts and culture, public participation in culture, and openness, tolerance and global connectedness. We have sought to reproduce those same aspects in the CCI Creative City Index. However, there are several critical aspects of the creative economy and creative society that are commonly not included in other indexes, and it is these aspects that we have sought additionally to include (at the price of scaling back some of the above measures).

At the core of this strategy is the role of what are variously called 'youth culture', 'consumer co-creation', 'digital literacy' and other factors that relate to the role of the creative and engaged citizen (and not just passive consumer) in making and producing (i.e. uploading and not just downloading) creative cultural content. The significance of this point is that our own research at the CCI has underscored the role of the creative citizen, and especially those from the margins, including the young, in recreating culture and the industries and economies that are built upon it (Hartley 2009; 2012; Potts 2011). As we have emphasised, a global city must first be a creative city, and a creative city is invariably powered by energy and the entrepreneurial experimentation of the young, of the outsider, of those seeking to create new ideas and to challenge existing ideas. A creative city will invariably be complex and challenging, 'lovable' more than 'liveable', edgy rather than middle-of-the-road, often with a clash of cultures,

demographics and ideas in its mix. Our index has sought to integrate these measures, including for example measures of youth and student populations as well as uploads and social networks for music.

The index has eight main dimensions, each with multiple weighted components (between 1 and 14), making for 72 distinct classes of measures. Furthermore, each of these is often composed of multiple measures (with between one to as many as ten individual distinct elements). Over 250 distinct measures are included in the index for each city. Specifically, consider the dimension and number of weighted measures:

DIMENSION	NUMBER OF WEIGHTED MEASURES
1. CREATIVE INDUSTRIES SCALE, SCOPE	5
2. MICROPRODUCTIVITY	14
3. ATTRACTIONS & ECONOMY OF ATTENTION	14
4. PARTICIPATION & EXPENDITURE	7
5. PUBLIC SUPPORT	1
6. HUMAN CAPITAL & RESEARCH	8
7. GLOBAL INTEGRATION	10
8. OPENNESS, TOLERANCE & DIVERSITY	13

This provides for a rich index that captures many aspects of a city's creative life, economy and potential.

Our findings are limited to the data from the pilot study of six cities, so it is too early to generalise from this. With respect to the rank order and index magnitude these findings were broadly in accord with expectation. London was expected to come out well on top, as it did. Of particular interest was the extent to which London dominated, often by an order of magnitude, and sometimes more. This is a feature that was not often seen clearly on many previous city indexes, which have tended to focus on variables that have less magnitude of per capita variation in them (such as number of hotels), or tended to cluster together (such as measures of openness).

On the 'economy of attention' dimension, London, and then Berlin, completely dominate the other cities, including Melbourne. It may indicate that the difference

between cities at the head of the scale differ from those at the tail exponentially, according to a power law scale rather than a linear one, resulting in a 'winner takes all' profile of leading cities compared to 'long tail' cities. This same 'super-scaling' pattern was also observed in microproductivity. These findings indicate that there is something special about cities that are both highly creative and simultaneously global cities, in that they are more than just bigger versions of smaller 'creative cities'.

What does this imply for strategic policy? Note that the CCI Creative City Index is calculated as the unweighted average of its sub-indexes (although weightings could be applied to the sub-indexes, if required). Also note that these scores are relative to a perfect score of 100 that would be achieved by a hypothetical 'best practice' combination of all six cities. In this sense, the index scores can be re-interpreted similar to the distance towards the production frontier in productivity analysis. That is, the scores represent the distance towards the city creativity frontier for Brisbane (48.7), Melbourne (53.2), Berlin (63.3), Bremen (48.6), Cardiff (44.5), and London (85.1). Thus London for example could expand its Creative City Index score by about 15% by improving its performance in any of the indicators where it is not already ranked first (e.g. by raising the level of cultural and arts funding per person by level of government to that of Brisbane). On the other hand, Brisbane can more than double its CCI-CCI score and move towards global creative city status by catching up with London in the majority of the 8 categories. Indeed, this is usual the aim of high-level government funding; and this index can assist policy-makers by providing robust, efficient, evidential data to measure comparative changes over time.

While these findings in themselves are interesting and illuminating, a proper analysis would require a larger sample of cities to be studied, as well as follow-up cross-checking and statistical analysis. This remains future work. At this stage, we believe that the proof-of-concept of the index has been successfully undertaken and that the CCI Creative City Index offers a best practice platform for the benchmarking of creative city rank and progress.

5.2 Application of the Index to Beijing and Other Cities

One purpose of this report is to provide for our partners in the BJSS a template for the application of the CCI Creative City Index to Beijing in particular, and to other Chinese cities in turn. Many factors included in this index will be straightforward to compile, especially for the factors relating to demographic profile, industrial structure, creative industries economy and employment, public spending, cultural infrastructure, cultural attractions, education and research, and so forth. Many of these same factors also feature prominently in alternative creative city or global city indexes.

The more challenging estimates will likely accrue to the factors that centre about microproductivity and the economy of attention. Having said that, these are actually quite easy to collect, as they are amenable to web-based search. The challenge, instead, lies in finding appropriate comparisons with the proxies used. In the dimension on 'attractions and economy of attention', for example, we used a raft of measures that pivoted off very specific sites such as Wikipedia, IMBD (movies), Amazon (books), iTunes (music), Google Trends (Internet search), Lonely Planet (youth tourism). It makes sense for these largely American sites to be the focal points in Australia, UK and even Germany, but given the difficulty or lack of success these companies have had in operating in China it would make sense for them to be replaced with local equivalents. While this is pragmatically necessary, it also makes comparisons across a global index more difficult without adjustments for scale, penetration, and so forth.

The same issue also arises with the second dimension 'microproductivity', where the index we have constructed pivots off a number of nominated but dominant digital/web sites that may have no equivalents in China. For example we have measured uploading from photo sites such as *Flickr* and *Photobucket*, presence and page creation on music fan-sites such as *Myspace* and *Bandcamp*, and membership on social network sites such as *Pitchfork*. None of these has a strong or dominant presence in China, and to that extent they are inappropriately applied there. Instead, local equivalents will need to be constructed.

Two other domains pose potential problems. The first relates to the standard classifications and definitions of industrial sectors and creative industries. The

definitions we have used in Australia, Germany and the UK are all more or less the same, and are based on satellite accounts recently used by national statistical authorities. These are influenced in turn by the 11-sector DCMS classifications (proposed in 1998) of the creative industries. China's classifications are not always identical to this, and in part tend to weigh toward the traditional cultural industries (including cultural tourism) and to include less of the more commercial and digital industries (e.g. software and video games in particular).

Indeed, in China the formula 'cultural and creative industries' has gained currency, linking creativity to heritage, artistic and customary cultures almost by definition. By contrast, there is a strand of work in Western creative-economy scholarship – including our own – that foregrounds innovation, dynamism, and entrepreneurial populism as the driving force. This means that there may be tensions between different definitions of creativity and culture (not just differences in what sectors are counted) across different jurisdictions. Such differences will produce widely varying and incommensurate datasets.

These issues of industry and sectoral definition, and also of the consistency of these classifications between local, state and national account, need to be carefully observed and reviewed. There are situations in which differing definitions may not pose a problem. If a Creative City Index is applied *only* to cities within a given jurisdiction (i.e. different cities within China), for instance, then Chinese definitions will apply consistently. However, if comparisons are sought across cities in different jurisdictions (say between China and Australia), then the results are only valid to the extent that the same definitional inputs are used.

A further point relates to the eighth dimension: openness, tolerance and diversity. These measures have been staples of creative city indexes since Richard Florida's work over a decade ago. We include them here for the same reason: They provide a good measure of the tolerance to different lifestyles and beliefs, which is a good measure of a city's willingness to tolerate and even embrace new ideas: it is a 'proxy' for openness to change and the readiness to value dynamism. But these issues can be difficult to measure because of sampling reluctance and reporting bias. The measures we have selected relate to levels of divorce (a proxy for women's freedom), sexual openness (the

'gay' index) and religious tolerance. Sometimes official statistics on these matters can differ substantially from what is true, definitions can vary widely, and there may be official interference in or intolerance of data collection (to say nothing of the behaviours being measured). Hence these figures can be hard to track and verify accurately. These were the figures that we had the greatest trouble with in the pilot index (along with measures of local networks and interaction), and of which we are least confident. Nevertheless, they are included for good reason and we believe that the index's quality is in significant part dependent upon quality inputs into this dimension.

We have also not sought to impress different weightings upon this index. Our initial supposition is that the 'equal weightings' model seems intuitively correct. Yet because some dimensions contained more variance than others, and also because the rankings were not always equal even in this small pilot sample, any change in the weightings will affect the overall outcome of the index and also the rankings.

Such issues will need to be taken up in future versions and applications of the CCI-CCI. We are confident that, with longitudinal comparisons as well as wider application to a greater number of cities, its accuracy as well as its utility will increase. It is like any system based on open connectivity; the more connections there are, the better it will be.

Appendices

Electronic Appendices: CCI Creative City Index; Sensitivity Analysis; Research Report; and Additional Notes.

See “The CCI Creative City Index 2012.xlsx” spreadsheet file.

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