

# Governing the Intelligent Metropolis

Report prepared for The Economic Commission for the Glasgow City-Region

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## 1. Introduction

The Glasgow City-Region Deal (GCRD), agreed in 2014, forms part of a wider UK programme of ‘deals’ to support city-region growth (Waite and Morgan 2018). It was struck by local governments, the Scottish and UK Governments to plan, finance and deliver £1.13bn of primarily infrastructure support for growth-enhancing projects. 27 projects across 3 key themes of People, Communities and Business are the key ‘promises’ of deliveries. A series of five-yearly Gateway Reviews will be conducted to cross-check the progress of Deal in meeting agreed outputs and outcomes. As Glasgow City Region Deal (GCRD) is funded by equal contributions from the Scottish and the UK Government, the national evaluation will be complemented with additional activity specific to the Glasgow City Region (GCR), recognising additional and complementary priorities (GCC 2019). The first Gateway review of GCRD is due to take place in 2019 and its Cabinet Chair was confident in the pace of delivering as by the end of 2018, six projects and five sub projects were completed (Gallagher 2019).

Planning and designing these major investment programmes, as has occurred in 37 similar territorial Deals in the UK, has tested the capacities of local bureaucracies and policymakers. Our interviews with some of the key city officials involved in managing these Deals have noticed apparent difficulties and unforeseen challenges in planning projects, modelling their potential economic impacts on metropolitan economies, delivering projects and then monitoring and evaluating them. Similarly, previous studies have highlighted a number of issues surrounding the efficiency of City Deals, including, for example, the relationship between the local and national states, the role of planning (Jones et al. 2017b), deal accountability and comparisons across cities (Jones et al. 2017a). This has raised questions, and sometimes doubts, about the robustness and quality of the thinking and decision-making capacities of local bureaucracies that govern their economic development strategies.

The authors’ previous research had highlighted the gaps between the rhetoric and realities of research for city-based local economic development strategies in Scotland just prior to the development of City Deals (Miao and Maclennan 2019). National and Scottish governments both expressed the hope that participating in city deals would raise local economic policy capacities. However, as senior officials involved in the GCRD have noted, this hope was potentially undermined in a period when tightening constraints on municipal capital spending and reductions in service budgets, especially for non-statutory services such as local economic development and research functions, were potentially reducing such staffing and in-house

thinking capacities. Therefore, it could be worthwhile to explore further the potential rhetoric and reality gaps when city region deals are in place now for Glasgow and Scotland at large.

This 'Governing the Intelligent Metropolis' report contributes to the holistic Looking Forward to Glasgow research which involves a number of key 'future thinking' workstreams. Its purpose is to build a Framework for Growth Drivers including 'Future Skills', 'The Metropolitan Innovation System' and 'Infrastructure and Homes for the Economy'. The focus of this report cuts across these projects. It grew out of the initial concern to improve the content and conduct of metropolitan economic policy arising from GCRD but goes well beyond that. 'Intelligent Governance' impacts what the Glasgow city-region chooses to do and how well it performs, it also reaches to the competences of households and firms within the metropolitan area.

The core aim of this report is to better understand the plusses and minuses of present approaches and the substantive basis of hopes and fears for the future. We seek to understand how to make national, local, community and individual (and combined) approaches to cities more 'intelligent'. Major challenges to what metropolitan areas will have to think differently about in the UK in the decades ahead include, as noted above, not just new global patterns of trade and investment, new technologies for all kinds of communications and ways of working, new and intensifying environmental shocks, but also new autonomies in decision taking as expenditure roles and tax responsibilities shift over time. The likely reality is that metropolitan areas will become not only larger 'chunks' of national economies but that the effectiveness of collaboration and competition between them will be central to national economic performance. Further, as the current costs of obvious vertical fiscal imbalances between cities and nations shape ever rising congestion costs and dampening economic performance (Eyraud and Lusinyan 2013), pressures for metropolitan fiscal devolution will intensify. Our interviews with the GCR leaders noticed a sense of anxiety to establish whether the notion of the coming 'metropolitan age' has substance, any obvious pitfalls and paths to progress, and whether policymakers and practitioners in Glasgow and Scotland are alert to the looming changes and aware of how best to move to the forefront of progress.

Clearly addressing the routes to 'metropolitan effectiveness' must address geographies of jurisdictions, markets and organisations, the assignment of autonomies and taxes, inter alia. These issues are considered elsewhere and not discussed at length in this theme paper. This project focusses more narrowly on the questions of metropolitan 'thinking' competences and capabilities to design and deliver effective economic and other policies and strategies.

We have conducted a series of interviews with key policy makers in charge and/or involved in city region deals in Scotland, with a special focus on GCR. Semi-structured interview protocol was adopted which ensured comparability across cases but also retained flexibility for participants to reflect on their specific city region conditions. Six broad interview themes were covered, including the governance contexts; policies strategies; thinking/research capacities; related approaches; policy innovations; and barriers to creativity/innovation. Most interviews lasted for 60 minutes and were recorded with permissions. Key points were transcribed and verified by interviewees.

This report is organized thematically. We started with the reflection of cities as complex learning systems in the next section. The challenges of governing such complex system are then discussed in section 3. Section 4 then explores system operations and challenges, drawing upon our interview materials. A brief description of the intelligent way forward is also presented.

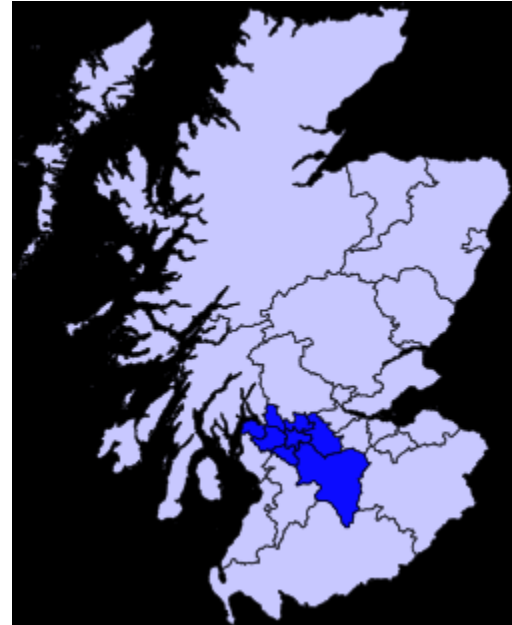
## 2. Cities as complex systems

Scotland is highly urbanized. Four-fifths of Scots already live in cities and large towns and, as for much of the OECD, it is expected that these larger places will be the locus of major population and economic growth in the future. The GCR<sup>1</sup> is home to 1.82m people, and just under 40 per cent of Scotland's population. Yet putting GCR against the background of decentralisation and localization trend in the UK (Colomb and Tomaney 2016), it is puzzlingly to see spatial structures of such large scale were brought back in operation.

To certain extent, the formation of GCR took into account the existing economic and social functional integrations between the eight local councils. As they had, along with several others, previously formed the Strathclyde region between 1974 and 1996. The re-united of these neighboring councils, therefore, might reflect the returned awareness of cities and city systems in economic prosperity. For much of the second half of the last century, cities, in academic and policy debate across the OECD, were widely regarded as places of economic decline, physical decay and social disadvantage (MacLennan 2002). Perceptions have been shifted by two developments in recent decades.

The first has been wider recognition that the world is increasingly urban, and that economic growth across advanced and advancing economies both drives and is underpinned by urban transformation (United Nations, 2011). The second is the new prominence given in both urban theory and policy to the roles that globalisation and 'agglomeration economies' have to play in raising productivity and facilitating creativity, 'buzz' and innovation (Florida 2005; E. Glaeser 2011; Storper and Venables 2004).

At the same time, cities do not stand alone but form connections with their hinterland and other cities domestically and internationally. Scientists who look at cities often start from the perspective of the city as a system, defined in physical process terms, or in ecological, biological terms. Not all social scientists see the metropolitan area as a coherent functioning system, some (David Harvey, for example) stress cities as fractured, segmented, disjointed collections of enclaves and exclaves of exclusion and discrimination, or as disconnected, non-equilibrating economic segments (Friedrich Hayek, for example). Others may emphasise the city as a system, adopting the metaphor of social ecological system, and some develop socio-economic spatial analogues of physical systems with balances of equilibrium and entropy (Batty 2016). Yet more (Glaeser, 2010) see a system at or near general spatial economic equilibrium (with classical physics and gravity the core metaphor with neoclassical economic and prices).



### Interview Reflection 1

Within the Glasgow City Council, an intelligent hub was set up around 12 months ago with the remit of supporting and monitoring the delivery of City Region Deal, constructing a regional database and economic modelling and informing intelligent decision making.

<sup>1</sup> It includes the following eight councils: East Dunbartonshire, East Renfrewshire, Glasgow City Council, Inverclyde, North Lanarkshire, Renfrewshire, South Lanarkshire, and West Dunbartonshire.

Due to resource constrain, this hub is now focusing on building the first regional economic model for Glasgow City-region through the spatial economic equilibrium approach. A spatial economic analysis deals with what is where, and why. The explanations provided are depended upon assumptions of the economic motivation and behavior of individual decision units and the ways in which their decisions react upon each other. A partial equilibrium theory focuses on just one or a few selected relationships, which can then be explored with greater attention to realistic detail, while other elements are taken as given. A general equilibrium theory of spatial economic relations takes cognizance simultaneously of all the most important types of spatial interdependence of firms, households, and other decision units.

In Glaeser (2010) and others, the key sectors considered are: labour, land, and production. The approach taken by the Glasgow Intelligent Hub is similar to this and focuses on supply and demand models. Since there is no pre-existing models and data available on the city-region level, this hub also heads the task of conducting feasibility studies, organizing discussions with stakeholders, and collecting best practice. The cities they are looking at include, for example, Belfast, North Ireland, London and Birmingham. But its small team at the moment with 1.5 full time employees is regarded as a barrier to take on such substantial modelling task satisfactorily.

In strictly economic and locational terms, the analytical model which still better describes the structure of the city system is Christaller's and Lösch's central-place model developed in the 1930's and 1940's. After the basic refinements introduced by Isard (1956), Koopmans and Beckmann (1957) and McPherson, a huge literature has grown which developed the logical foundations and simplifying assumptions but has not changed the basic economic characteristics of the initial model: it still remains the more elegant, abstract but consistent representation of the hierarchy of urban centres. Camagni (1991) associated the central-place model with the territorial spatial behavior of a firm, where the main activity of the firm is production, and it sells and buys from the geographical space it controls gravitationally. Transport cost is the single most important factor that both divides this market gravity and differentiates the products of companies. Under these assumptions, space is organized into the Loschian honeycomb of market areas. Gravity-type considerations may attract the different firms towards the centre of the territorial market, where demand density is higher. This spatial format of city system might still hold validity at places where their primary economic activities are: agricultural production; public administration; and private and public services. GCR resembles the Christaller central place model to certain extend, as Glasgow is the dominate economic hubs with high concentration of government and service functions. The other seven local council areas are on a lower hierarchy given their smaller size, but they still hold a relatively complete functions as a central place. Connections between these cities, under the central place model, are limited and are confined to seeking higher rank services from Glasgow.

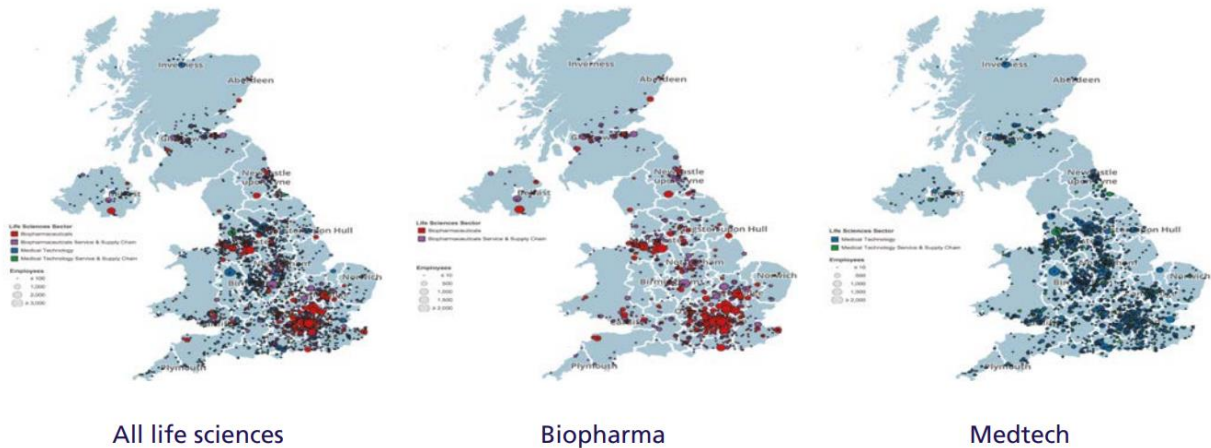
### **Interview reflection 2**

Our interview with Perth city leader seems to confirm this point. Perth City Council started working with four other local authorities on the political basis ('we have the same political colour'). But there is different driver to work on the regional agenda. This senior politician had tired years to improve

governance and collaboration but realized that it would ‘never get that proper functional economic geography approach in service delivery (even with City Deal), unless the Scottish government mandates the local authorities to re-organise and co-operate’. Yet this interviewee pointed that a functional city-regional approach might work better for GCR because the dominance of Glasgow, but for others it was much more challenging. In this sense, the micro city system in GCR resemble a basic unit within the Christaller central place model, where Glasgow controls and provides higher order services to a wider catchment; other local council areas have their day-to-day needs covered by local markets and suppliers.

Yet globalization and intensified competitions gradually change the strategies of companies. Camagni (1993) distinguished a second type of the city network, which is derived from a competitive logic of company behavior. In this typology, seeking international market shares is the main motivation of companies, and in this process individual unit tends to get specialized. ‘Space and spatial dishomogeneities are no more a simple constraint to the output market, but are directly exploited by the firm in a global optimization process which takes into consideration, beyond the accessibility to geographical markets, the accessibility to labour, skills and other production inputs’ (ibid, p70). Michael Porter (1990)’s *The Competitive Advantage of Nations* also elaborates how competitiveness-driven companies are strategically choosing locations with the best combination of labor, consumers, suppliers and institutions in allocating their specialized units. Localities, therefore, are known for their specific offerings, such as cheap labour in southeast Asia and talents in the San Francisco Bay Area. Global cities and global city rankings are also become relevant where a few cities – which might be geographically small – could take on significant economic and command functions (Hall 1998). This second logic thus links domestic market with global input-output chain as the market of a firm is not restricted to the local territory and transport costs play a smaller influence.

Scotland and especially Glasgow used to suffer from a ‘branch plant economy’ (Phelps 2009) and occupied a lower value-added position on the global production chain. Even now, Scottish cities are still in a relatively marginal position in global city system ranking, although we have been improving our status in Europe and in selective sectors. The Life Sciences Sector, for example, has emerged strongly in GCR (Bell 2017), and has been identified as a key supporting target by the City Deal. Three key projects were included, including Stratified Medicine Imaging Centre of Excellence; MediCity; and Glasgow Grow-on Centre for Business Incubation and Development. Yet our interviews in Scotland also noticed a universal focus on life sciences and related sectors in all the cities and city region deals. The relatively small size of Scotland might justify such common focus, as it has the potential of leveraging agglomeration and promoting knowledge sharing. At the same time, the potential challenges of duplicating capital infrastructures, competing for investments and human resources, and blocking knowledge exchanges due to political and/or business interests, should also be looked into.



Source: Strength and Opportunity 2016

Fig 2 UK life Science Employment 2016

Moving beyond this competitive city system, Camagni (1993), Taylor (2004) and Neil et al (2010) pointed out there is now a third logic of company behavior emerging, one that is based on network and cooperation to gain a leading position in innovation. Compared to the loosely connected city system in the territorial logic and the specialized city hierarchy in the competitive logic, cities are now closely linked both horizontally to their parallel peers and vertically to higher order command centers. They are not only ‘nodes of localized and specialized know-how’ but also ‘multi-functional nodes belonging at the same time to different economic and spatial networks’ (Camagni 1993, p71). A city-network, formed on the basis of horizontal linkages and similar functions therefore, could provide complementary, synergic or innovative ‘club goods’ to its members. The Golden Triangle in England<sup>2</sup> and the Edinburgh-Glasgow corridor in Scotland present some of the best examples here. Yet the configuration and function of the latter requires further discussion to form shared visions.

### Interview reflection 3:

The Edinburgh-Glasgow Growth corridor was promoted strongly since 2009 through the Glasgow Edinburgh Collaboration Initiative, which was a collaborative project between the two city councils and Scottish Enterprise. It was initiated due to the belief that major cities can make a significant impact on the country’s growth and performance: combined cities are better able to provide needed critical mass and scale. yet after years of its conception, limited progress has been made besides the improved physical connections between these two powerhouses.

Many of our interviewees pointed to the necessity of changing the ‘mindsets’ of chief decision makers in these two cities before meaningful collaborations could happen. In this sense, the separate City Regional Deal they got, which directs their attention to their immediate hinterlands for project deliver and growth promotion, might further defer conversations. The Scottish Cities Alliance, according to our interviewee in Perth, plays an important role here in terms of creating a ‘mini clique’ for policy makers

<sup>2</sup> It comprises Oxford, Cambridge and London and the areas in-between.

to share visions and identify ways of cooperation. But the dawning of City Deals has unavoidably impaired SCA's function, with the two powerhouses in particular having been showing less and less interests.

The Golden Triangle is a concept conceived around 2005. First coined to describe the relationship between the universities in Cambridge, London and Oxford, the 'Golden Triangle' has now become a hot bed for companies in the 'knowledge' economy – technology and the sciences. The cities are sharing similar functions (education, high-tech sectors) and their networks could leverage the competitive position of not only the universities and the private companies but also the UK economy as a whole. These cities are well placed to benefit from the growth of the digital economy and investment in the Cambridge-Milton Keynes-Oxford corridor. It was also forecasted that an increased investment turnover in life sciences, property would happen, which will feed through to higher rents and enhanced capital values for commercial property within the Golden Triangle. To enhance their connectivity, a National Infrastructure Commission report recommended a £27m commitment to an Oxford-Milton Keynes-Cambridge Expressway. Local authorities, local enterprise partnerships and central government were also intensively consulted and engaged in developing and delivering an integrated strategic plan for infrastructure, housing and jobs for the Cambridge – Milton Keynes – Oxford corridor (NIC 2017).

Therefore, to manage future growth, more needs to be done to understand how these city systems function and evolve, why large and growing size matters, and how they are being impacted by new approaches to inclusive and sustainable growth. The interest in understanding how city systems function and how they are impacted by government, municipal and community actions has also been substantially raised over the last decade. Emerging policy and academic dialogue about the future of cities is increasingly informed by systems concepts such as the notion of spillovers, feedback loops, networks, and inter-connectivity (Miao 2018). In addition, the acknowledgement of disequilibrium and evolutionary processes (Martin 2010) also recognises that the city systems may not be balanced and self-correcting (homeostatic) and instead are capable of rapid, non-linear changes in disruptive and difficult to manage ways (especially at more localised spatial scales).

It is therefore clearly not sufficient simply to say the city needs to be seen as a socio-economic system but to spell out the likely nature of a metropolitan system that recognises learning and change through the state as well as the market. There are ten key features of cities as systems that are likely to be:

- The future of metropolitan areas will reflect the interaction of technological and socio-economic systems;
- Drivers for change will arise from outside the metropolitan system, i.e., the system will be partly open;
- That openness will relate to regional, national and global connections, that is, connections to much larger spatial systems;
- The influence of these different scales will invariably mean that policy influence from all scales will meld and matter within metropolitan areas (whether it is coordinated or not);
- The system may also be driven by bottom up change from within, that is, it is the system, with local sub-systems, that is potentially creative;

- The system will, in some dimensions, be flexible and responsive in the face of change, but it will also have fixities, particularly spatial fixities of capital investment, so that aspects of the metropolitan system will show fast change and others slow change;
- Both public and private responses to change may be shaped by past trajectories, so that path-dependency will be a key feature of city systems;
- Some systems will be homeostatic, so that once disturbed they will tend to restore equilibrium and they will differ in their inherent resilience in the face of shocks;
- Other systems will be transcendent so that movement implies change, some change may trigger recursive processes, and some may create new structures or relationships that will shape emergent change.
- Metropolitan systems will be complex and evolving and to be managed effectively, an intelligent and learning approach will be required to anticipate and shape changes.

In broad terms we adopt an evolutionary, learning system perspective in which intelligent individuals and entities try to understand causal change processes and learn from observing outcomes as they unfold. This approach requires neither simply top-down nor bottom up perspectives, but recognition of a recursive change process that may shape a need to refashion interaction and coordination mechanisms between different actors and different system levels. That is, we argue for an *'intelligent'* city policy approach that features a constant policy 'learning' mechanism, where interactions lead to institutionalization; yet incompatibility and changes could result in conflicts and tensions that cause a new round of social interactions and learning process (figure 3). For example, sustainable development emphasises the importance of connections between human behaviours and ecosystem outcomes. Consequently, policymakers at neighbourhood, city and metropolitan scales have absorbed, perhaps more than national governments, the importance of holistic approaches to complex problems. This has led, at city scales, to new governance approaches that connect more effectively the spillovers and synergies between different policy areas (MacLennan, 2013). Here the importance of an effective system governance mechanism emerges strongly at a time when new autonomies are accruing to metropolitan areas. For these autonomies to be real, or realisable, rather than notional, much is dependent on the policy capacities of metropolitan governments. National economic policies, for cities and nations, need to be rethought and re-engineered in the light of devolution, as responsibilities and instruments of policies are redesigned and reassigned (Miao and MacLennan 2019). We will turn to this point in the next section.

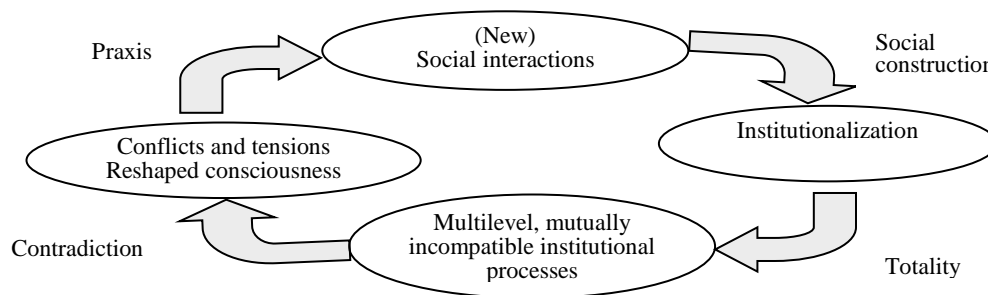


Figure 3 Institutionalization and institutional change: process from a dialectical perspective

Source: Seo and Creed (2002, p225)



### 3. Governance system

Komminos (2015) believes ‘the Intelligent City is becoming the dominant urban development and planning paradigm of the 21st century, connecting urban, innovation and digital environments and setting in motion powerful socio-technological engines for change and sustainable growth’. He argues that ‘A new world is rising, challenging the established order and hegemony of the west; a global world, not only fueled by information technologies, intense competition and global knowledge flows, but also shaped by local creativities and user-driven innovation’.

We agree with his view on the importance of local creativities, but we also argue that being ‘intelligent’ applies to cities and city governance as well as firms and individual, in terms of how it applies to create, shape and deliver policies. An ‘intelligent’ approach involves not just using the best insights for dealing with existing problems but also must be at least equally concerned with the future. It must embrace questions of economy and society as well as technology. But the multiple layers of powers and different interests of stakeholders might make the learning and reflection exercise difficult (Cowley et al. 2018).

#### **Interview reflection 4:**

These entwined power relations exist within the city council, between city councils and the regional governance structure established for the city deal, and across local and national governments.

Within the city council, two major challenges were identified by many of our interviewees. The first relates to the imbalance between resource and responsibility, which has been noticed by Miao and Maclellan (2019) in their earlier auditing of Scottish cities’ economic performance. The increasingly constrained human resource in particular has limited opportunities for cross-departmental conversation and collaboration as commented by our Glasgow interviewees, as people are occupied with ‘delivery’ not ‘thinking’. The second challenge is the lack/weakening of collaboration culture and a fear of failure. In Glasgow, for example, there has never been a ‘brain storming’ session organized across different departments, which is partially resulted from a ‘business as usual’ atmosphere, as senior policymakers and chief executives – who are often in their 50s and 60s – might have already gone through several major changes within the institutions, and therefore do not have the enthusiasm to launch another one, but instead hold a ‘wait till I retire’ attitude.

Within the city regional deal, relationships between local authorities are not always smooth as one expects. In Edinburgh for example, we were told that its regional economic strategy was delayed partially because the maturity level of individual local authority, political sensitivity, and some of the ‘old scares’ inherited from the former city regional council that strained local partnerships since 1990s. Although in discussing the deal, political leaders and chief executives have met regularly and thus surpassed some of that distrust relation, local authorities are ‘stubborn’ and there is ‘suspicion’ of what the economic strategy tries to do.

Vertically, the Scottish Government pays increasing attention to inclusiveness and equity in deal-making (Waite et al. 2017), yet the UK government still prefers sticking to per-capita basis in allowing fund. At the same time, the emphasis on equity and growth distribution has somewhat diluted money needed in the center of growth areas and key sectors, as commented by our interviewee from Perth. Here the desire

for agglomeration economy in major growth sectors, such as life sciences and digital infrastructures, rub against the tricky reality of political interest and power balance. There are also situations where rationale decision makings were subordinated to political interests, as in the case of Highland, where projects got funded through city deal because they fit with the national political priority.

We start from an assumption that metropolitan areas compete with each other and that the style, capabilities, imagination and outputs of local governments, as reflected in quality of public policies, strategies and services, is an important influence in that process. Previous studies, for instance Putnam (2000) and Fukuyama (1992) have emphasised how styles of government can positively influence trust, partnership and innovation within cities, and other have highlighted how weak, introverted or corrupt governance may damage city growth prospects (Hambleton, 1999). Yet there is often limited contemporary understandings of the formation of economic policies at sub-national scales of government.

How do we begin to address these aspects of metropolitan governance? To start with their definitions, ‘government’ refers to formal institutions of state and monopoly on coercive power. Assumption goes that they have capacity to make and enforce decisions, maintain order & coordinate collective action (Stoker 1998). ‘Governance’, however, focuses on governing mechanisms which do not rest on recourse to the authority and sanctions of government. Instead, it ‘refers to a new process of governing; or a changed condition of ordered rule; or the new method by which society is governed’ (Rhodes, 1996, p 652–3). the emerging consensus is that the governing styles have changed in which boundaries between and within public and private sectors have become blurred (Stoker, 1998, p17).

Table 1 Typology of public policy instruments

Type of instrument	Type of relation to polity	Type of legitimacy
Legislative and regulatory	Social guardian state	Imposition of a general interest by mandated electoral representatives
Economic and fiscal	Wealth producer, redistributive state	Seeks benefit to the community; social and economic efficiency
Agreement- and incentive-based	Mobilising state	Seeks direct involvement
Information- and communication-based	Audience democracy	Explanation of decisions and accountability of actors
<i>De facto</i> and <i>de jure</i> standards; best practices	Adjustments within civil society; competitive mechanisms	Mixed: scientific-technical, democratically negotiated and/or competition, pressure of market mechanisms

Source: Halpern et al.(2011, p49)

The current city deal approach represents a combination of economic, fiscal and incentive based instruments to support evidence-based, development-oriented local development. It also involves co-identifying development targets, tools and monitoring mechanism between partners (O'Brien and Pike 2015). One quickly emerging development focus that public and private sectors are fascinated about – which also features in some of the deal-makings in Scotland – is supporting innovation in ‘smart’ cities (Townsend 2014), albeit the precise meanings of the concept and its implementations have varied from place to place (Hollands 2008). Much of the literature on ‘smart cities’ is essentially technocratic in nature (Kitchin 2014; Yueh 2010).

#### **Interview Reflection 5:**

Glasgow is the first Scottish city that engaged in smart thinking by winning the high-profile ‘Future Cities Demonstrator Competition’ in 2013, organised by the Technology Strategy Board (TSB), later renamed as Innovate UK. Among the 24m GBP funding, nearly half was spent on an integrated Operations Centre, integrating traffic management, security, and public space CCTV, and providing real-time city data. However, as anticipated by Leleux and Webster (2018), many of Glasgow’s Future City projects are stalled or reduced in scale at the time of our interviews, particularly because the political churns and particularly because the challenge of creating sustainable engagement mechanisms that allow meaningful citizen engagement and participation. Few of our Glasgow interviewees, for example, knew this demonstration programme, and none of them knew where this nearly £12m integrated Operations Centre was hosted.

SCA has also done work on smart city by launching the Scottish 8<sup>th</sup> City – the smart city. This 8th city is a virtual city and has a focus on themes of ‘data’ and ‘technology’, including the promotion of mobile technology and social media (Miao and MacLennan 2019). Yet again, its focus is on tangible technology investment and database, with limited public engagement. There is also double regarding its future (‘to scale-up or to stop’), as remarked by our interviewee in Perth.

Smart city projects also feature in the city region deals. Edinburgh is most ambitious in becoming the ‘Digital Capital of Europe’. To support this ambition, £300m of Edinburgh city deal went to innovation, especially data-driven innovation, and major universities doubled it and The University of Edinburgh and Heriot-Watt University lead this initiative. It is aligned to the City Region Deal’s Skills and Employability component, and will improve citizens’ digital skills through working with schools, further and higher education, employers, and training providers. For our Edinburgh interviewee, although there was still a bias towards physical investment, this deal-making process has managed to bring together higher education sectors, public institutions and private sectors for the first time, making universities realise their economic and civic roles. In this regard, Scotland still falls behind the Northern Powerhouse in fully utilising the knowledge storage and human resources of their universities.

In Glasgow City Region Deal, however, there is no explicit investment/project that will build upon the existing Future City infrastructure in GCC. There is also no regional level smart city strategy. The remaining work of Glasgow Future City is carried out by a separate unit which has no overlap or conversation with the new Intelligent Hub. This is a wasted opportunity in our view.

Pushing further our thinking on smart cities, we argue that whilst new technologies for working, moving, communicating and living will be important shapers of metropolitan change, their use and impact will be determined by individuals, businesses and by governments so that human behaviours and government choices will matter too.

Fully ‘Smart cities’, or what we choose to label ‘intelligent cities’, do not emerge simply from better engineering of technological information or big data flows. They also imply better informed city strategies and service delivery systems that incorporate understandings of human and organisational behaviours in these change contexts. An interest in the roles of information and knowledge, and associated networks and institutions, in the functioning, growth and management of cities now augments older perceptions of cities as well-defined geographies of land uses, real estate structures and the transport flows that connect them.

In consequence, and hopefully to rebalance the focus back towards human uses of technologies, ideas and data, we have chosen the label of the *‘intelligent-learning’ city* whilst recognising this concept too is not without ambiguity. Yet in using this term, our core aim is to emphasize how city use intellectual capital and stocks of knowledge to identify the policy challenges it wishes to address, how it uses data and ideas, the methods and approaches used to think about the future, and in ‘learning’ how it innovates both in policy design and knowledge management, and develops networks, institutions and systems, to learn from experience and adapt priorities. To provide a better understanding requires us to spell out our meanings of both ‘intelligent-learning’ and ‘system’.

### ***Intelligent, Learning***

We adopt a simple but full notion on ‘intelligent’, recognising that intelligence is a diverse and contested concept. Wikipedia includes key features of ‘intelligent’ as using logic, understanding, self-awareness, learning, emotional knowledge, planning creativity and problem solving, or more generally ‘it can be described as the ability to perceive information, and retain it as knowledge to be applied towards adaptive behaviour within an environment or context’. We take learning to be the processes by which intelligent systems scan the environment, think, order information and create new ideas.

### ***Beyond Smart***

Komninos (2015) notes that ‘An extremely rich digital spatiality over the cities has given birth to a family of new concepts such as cyber cities, digital cities, smart cities and intelligent cities, all placing emphasis on relationships of collaboration between citizens, innovation actors and digital agents.’ This seems reasonable; however, the most common smart city approaches remain detached from economic analysis and policy formation at city scales. In contrast to work on sustainable development, system-based arguments are often implicit rather than explicit in discussions of city economic development (RSA City Growth Commission, 2014). For example, policy interventions may implicitly employ a system perspective through identifying interactions between component parts of an intervention, or explicitly employ it in modelling consumer and producer behaviour. These perspectives, that often remain weak on the framing of economic system interactions, have been important in shaping new, more comprehensive city governance approaches (Boyd and Folke, 2012; Ostrom, 2012), which challenge the dominance of narrower policy frames for city development such as the ‘creative’ city (Florida, 2005), ‘skilled’ city (Glaeser, 2010) or ‘smart’ city. We label this an intelligent-learning city systems approach.

#### **Interview Reflection 6:**

Miao and MacLennan (2019) argued for adopting a logic chain in policy implementation and monitoring, which requires that, first, the desired targets are defined by local governments. Intermediate outcomes

are then listed, which are still abstract but help to elaborate the targets. Outputs for each intermediate outcome are then identified and they are, usually, capable of being tracked by some standard and credible statistics. These outputs are then cross-matched with resources available within the city (such as revenue and human resources) and the activities needed to achieve them.

Aberdeen is seemingly most advanced in adopting this logic chain in monitoring their city-region's progress, although its adoption is more subconscious than proactive in nature. Specifically, the city's economic advisors have developed a monitor framework. We were told that 'there is an awareness of input, output and outcome approach; we try to capture outcomes as wide as possible. for particular policy, such as the city-region deal, we do not have data or models at the regional level, but we got some output measures that might reflect its progress. For example, the knowledge centers within the deal, we might look into innovation outcomes such as patents, to reflect its impact'.

Dundee used to a forerunner in applying this logic chain thinking and had been relatively advanced in identifying their inputs, outputs and outcomes indicators. However, for its city region deal, project selection came before its regional economic strategy. According to our interviews, a series of stakeholder events had been held at which a vision for the region was set out, along with the strengths, opportunities and challenges. Partners were then invited to submit project ideas to capitalise on these. Submitted projects were primarily considered in relation to their deliverability and their fit with the high-level priorities of growing jobs, dealing with worklessness, and closing the productivity gap.

Similarly, there was no logic chain approach in selecting projects and setting up the high-level regional economic strategies in Highland and Perth. The common approach is that a joint partnership is formed first, which then discuss and identify those key projects with substantial economic impacts and/or big land remediation requirement for business uses. Economic outcomes, measured by either the KPMG model (as in Glasgow) or the Growth Accelerator Model (as in Dundee), therefore, are still the major criteria in selecting projects and allocating resources.

It can be argued that both the smart city approach and much of the economic analysis conducted for city policy-making abstract the governance/politics dimensions of metropolitan policy decision taking. Urban economics often discusses policy options as if metropolitan governments, including bureaucrats and politicians, were well informed about goals and how to attain them. Yet as our interviewee from Aberdeen highlighted: 'Nothing sticks in Aberdeen, everything can change' – and this includes economic goals and strategies. In economics, we typically either ignore the limits to 'rational' behaviour or more occasionally explore how urban settings shape political economies through market choices, such as the Tiebout hypothesis, or Ostrom's spontaneous organisations view. There is little integration of economic and political science perspectives at the sub-national scale. How sub-national policies are envisioned, resourced and delivered, have received little academic attention through the decades of 'localism' advocacy.

The political economy of local choices also often disappears in the smart city discussions. Effective policy making is key to delivering better outcomes for those who live and work in cities, but this poses the key question of how city governments and city leaders learn and make decisions. The development of smart technologies fits with the image of cities as systems which are open to inflows of information, alert to innovation and capable of learning. But such settings are also riven with the politics of public choices and

debates that are all too readily downplayed in the technocratic ‘smart city’ literature. *The concept of a fully ‘smart city’ needs not only to view cities as intelligent, learning systems that make best use of available data, but also needs embrace the reality of conflict and different views on what we know, how we know it, and what this implies for future actions.* The discussion of knowledge, power, boundary spanners, knowledge mobilisation, and knowledge co-production discussed in Orr et al (2016) appear to take on a special resonance in relation to rethinking cities.

#### 4. Challenges and the way forward

Therefore what we are trying to push forward is a recognition that ‘intelligent-learning’ approaches apply to policy-making processes, that ‘economic policy’ has to be set in that context locally and that living laboratories are not just for consumers and the environment but need to have the metropolitan economic system at their core. These governance competences are potentially key to city competitiveness and cooperation. But the question is, do they emerge from random individual political or bureaucrat preferences or through incentive, creativity and persistence mechanisms?

Once our notion of the elements of an intelligent-learning city are in place, we would seek to understand where and why they occur and to contrast what we conclude to be good practice with the GCR, identify gaps and suggest remedial changes. Through this process, we aim to understand how GCR succeeds and fails as an ‘Intelligent-Learning City’ and how it might improve future performance in governing metropolitan economic change. Our interest is in how economic policies, for cities and nations, need to be rethought and re-engineered in the light of that devolution as responsibilities and instruments of policies are redesigned and reassigned. This requires not simply thinking what the ‘nation’ might do for the cities, but how the competences and conduct of cities drives (or drags on) the progress of the nation.

In what follows, we will summarise some of the key observations we made through interviewing and document analysis. Many of these points apply to Scotland as a whole, but we have tried to pin point the ways forward to GCR specifically.

**Observation 1:** City-region deal has brought back a system (regional) thinking; but it has been mainly approached through a ‘stick’ rather than ‘carrot’ manner.

A good governance style, as discussed earlier, involves both incentives and regulations, with the former takes on a more important role. This is because partnership is more solid and sustainable when members’ interests are balanced and secured, and they realise the added value of joining in the club.

Based on our interviews, a common reflection among interviewees is that, city deal partnerships emerged primarily on the basis of getting funding. They tended to base on existing relationship instead of a meaningful rethinking and reflecting on member composition. Our interviewee in Glasgow recalled that in preparing the GCRD, the eight local authorities were responsible for developing their own strategies. Scottish Enterprise, a major national economic development agency entrusted with the task of delivering a significant, lasting effect on the Scottish economy, supported the idea that these local projects should be self-assembled. What has resulted from this ‘assemblage’ approach was a collection of investment priorities

that more like ‘asks’ than well-thought off strategies. Structurally, the main governance board for CCRD was consciously kept small and tight without too many members, in order to avoid tensions. But by downplaying the initial negotiation and interest alignment process, a certain level of resistance and ambiguity was felt by our interviewee, as ‘people feel they are forced to come to regional partnership and as a result they refuse to attend (meetings)’. He also mentioned that the idea behind partnership is often ‘bespoke’ and ‘bottom-up’, so that partners often came with their own decisions instead of being told what to do. This had further deteriorated collective actions.

Yet on the positive side, the parentship of GCRD is relatively mature compared to others. In Edinburgh for example, the historical relationships between local authorities and Edinburgh city council meant that there was a lack of trust and high sensitivity regarding collaboration, as people tend to view it as ‘taking away my job’. A few local authorities also kept the desires to do things independently. Edinburgh City Region also missed the opportunity of partnership building pre-deal, as both the regional economic strategy and the regional enterprise council were formed afterwards. Therefore, for our Edinburgh interviewees, it was a significant process even for city leaders to sit down and talk regularly on regional issues, and it was believed that having the deal accelerated this collaboration process across the city system.

Looking forward, it is recommended that a conscious partnership building effort be allowed by GCR, both in terms of aligning interests and reaching consensus between members, and in better allowing city functions and governance structures. Although we noticed that GCR resembles a Christaller central place, awareness should be duly paid to competitiveness and network structures that link the various local authorities to their international peers.

**Observation 2:** The cut of local budget and deprivation of resources have further constrained thinking capacity.

All the cities mentioned resource constrains as one key obstacle in developing their thinking and networking capacity. In Edinburgh for example, there has been a one-third cut of human resources. In Highland, ‘local councils have thinned down their economic functions’. Over the last ten years, there had been a 50% cut of employees. Now we were told that they only had 20 to 30 people working on economic strategy, including the city deal, and 50 to 60 in total if also including the functions of housing and infrastructure.

For Dundee, we were told bluntly that ‘there is a resourcing challenge to create the headspace for ‘future’ work. The focus is on service deliver with little headspace to think strategically’.

Very similar, in Glasgow our interviewee who is responsible for the governance of city deal and regional economic growth, complained that ‘we have a very small team to support these eight investment portfolios. So the idea is that each local authority delivers their own portfolio (table 2 below). The challenge is that we only have 3 people, instead of 100 to define and refine the strategy’.

Table 2 GCRD Portfolios - Role and Remit

<b>Portfolio</b>	<b>Lead</b>	<b>Portfolio</b>	<b>Lead</b>
1. Transport & Connectivity	<b>North Lanarkshire</b> (improve links between communities, jobs, learning and leisure opportunities)	5. Inward Investment & Growth	<b>Glasgow City Council</b> (maximise the inward investment)
2. Enterprise	<b>Renfrewshire</b> (increase the number of start-ups; create the right conditions for existing businesses to become sustainable and grow)	6. Infrastructure & Assets	<b>East Renfrewshire</b> (communications networks, sewage systems, energy plants, digital connectivity and other facilities)
3. Skills & Employment	<b>South Lanarkshire</b> (develop a new and innovative skills and employability)	7. Land Use & Sustainability	<b>East Dunbartonshire</b> (ensure that an appropriate mix of land available for industrial, commercial, leisure and housing uses)
4. Tourism & Destination Marketing	<b>Inverclyde</b> (grow and develop the economic benefits of GCR as a tourism and visitor destination)	8. Housing & Equalities	<b>West Dunbartonshire</b> (local housing needs, stock quality, fuel poverty and energy inefficiency, the mismatch of supply and demand, housing needs of an aging population)

Source: GCRD (2017)

Two further consequences could be derived from the resource austerity. The first is skill constrain. As one executive for economic growth in GCC commented that, ‘jobs in the public sector is no longer regarded as previous by young people, who tend to move on and even move abroad as they are ambitious and want to get their training and knowledge paid for. Less capable and/or older people tend to stay, who do not have the energy and desire for change. People working in the institution for 30 years are also trained under different ways. Rather than diversifying their skills, they emphasis on ‘professionalism’ and are not good at managing complex tasks’. One example he gave was a unit called ‘Building Standard’ which used to be staffed by 45 people with an average age of 55. After bringing in four new managers, all female and under 25s, a big difference in terms of service provided and service standard was noticed.

The second is the uncertainty involved. As for private companies, a stable revenue flow for the public sector is important for long-term, strategic decision making. Many city leaders we interviewed however, anticipated further budget cut. For Glasgow, our senior interviewee projected this figure could be 10-15%, albeit there had already been 20% budget reduction. The funding brought by city deal only accounts for a fraction of council spending. In Edinburgh, for example, the £1.3m deal, when stretched over 15 years, covers less than 1% of the council spending. Leader from Highlight also mentioned that ‘you cannot overblow what the deal is doing. City deal accounts for 5% of the council’s budget, whereas the Highlands and Islands Enterprise budget is three times bigger than city deal’.

The draining income therefore, pressures local authorities to be highly cost-sensitive in spending on future work. Nonetheless, such uncertainty could have also induced more future scenario analysis and risk-presentation actions if happened in the private sector. But as discussed by a senior official from GCC, public sectors tend to still function under the assumption of ‘business as usual’ because there have never been



major disasters and/or there is a lack of risk awareness compared to the private sector. Here unique spatial conditions and histories come into play. For highland, our interviewee remarked that, its remote location has cultivated a strong collaborative culture long time ago. The author (Miao and Phelps 2019)'s study of Singapore also revealed that this city-state's dependence on its hinterland for such fundamental living needs as water and land, has sustained a 'sense of emergence and scarcity' even today.

Our recommendation here are twofold: first is to cultivate a risk-awareness through scenario analysis and devote mental resources in monitoring and tracking changes. Edinburgh City Council had done some scenario analysis before led by one of the authors of this report. Its practice and lessons learnt are worth borrowing. Second is to fully leverage the knowledge storages in local universities and colleagues, which we will turn to below.

**Observation 3:** City-region deals brings universities and colleges in for the first time; but their engagement varies.

Almost all the cities interviewed mentioned that their local universities were consulted and/or engaged in delivering the deal. Edinburgh city regional deal is arguably one of the most advanced in terms of utilizing the resources of their local universities. Verse visa, the local education sectors also realize their civic role in economic and social growth besides education and training. The Data-Driven Innovation initiative (<https://ddi.ac.uk/>) for example, aims to increase the contribution of university research and in-demand graduate skills to the region's economy, launching more spinout companies, attracting start-ups and established businesses, and driving public and private sector investment. So far five data-driven innovation 'hubs' have been created, housing expertise and facilities to help ten industrial sectors become more innovative through data. The University of Edinburgh hosts the Bayes Centre, Edinburgh Futures Institute, Easter Bush campus, and Usher Institute for Population Health Sciences and Informatics. The National Robotarium is a collaboration between Heriot-Watt University and the University of Edinburgh. According to our interviewee, this was the first time that local high education institutions were involved and proactive in working with the city.

Also impressive is the practice in Dundee. To identify key projects for its city deal, a broad stakeholder meeting was organised and some key infrastructures/sectors are led by the universities. These include the Life Sciences sector, which is headed by Dundee University; Cyber security which is led by Abertay University; and the Eden Campus that shepherded by the University of St Andrews. Perth city council has also been very proactive in utilizing the knowledge resource of universities. We were told that the council has set up a MSc programme with Dundee University, which provides training to civil servants in working differently. Dundee university also provides support on the council's design thinking. A formal internship has also been set up for MSc students to work in the council. As it becomes clear, local universities are involved in setting up and/or leading these emerging sectors that the city regional economy will need. The importance of engaging local universities has been pushed by the EU smart specialization strategy, which moves away from a 'one size fits all' approach to regional innovation based around a science and technology push model. Local universities are regarded as important local assets that could build upon the regional strengths. Their closer engagement in social and economic growth also help to promote inclusive

growth and industrial upgrading strategies that emphasized in Scotland, representing a moving towards the civic university model that represented by Stanford University (Etzkowitz 2008) and promoted by many UK scholars.

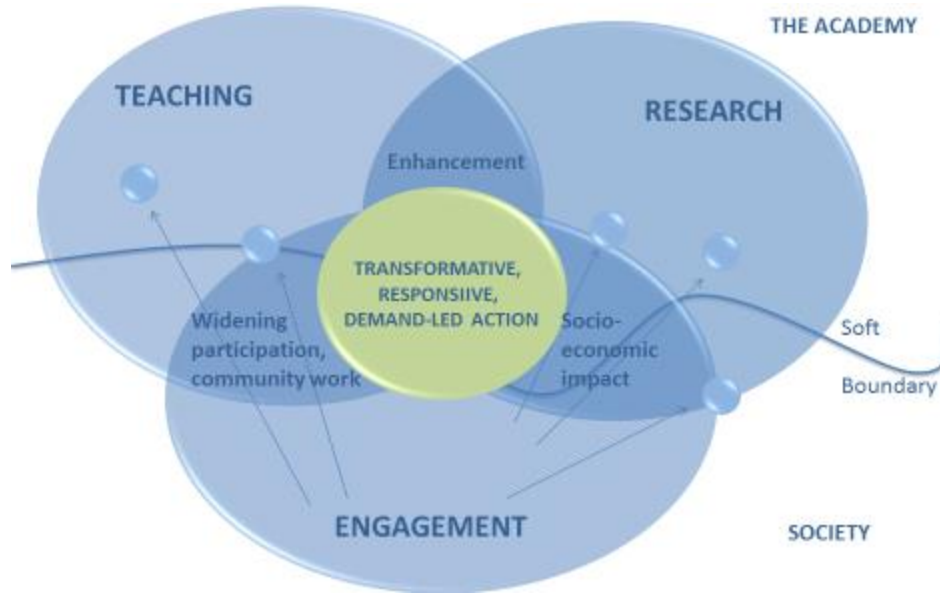


Figure 4 A civic university model

Source: Goddard (2018)

In GCR, there are several leading universities including the University of Glasgow and the University of Strathclyde. UoG for example, has risen eight places to 80th in the 2018 Times Higher Education World University Rankings, and UoS locates at the heart of Glasgow City Innovation District, which is a hub for entrepreneurship, innovation, and collaboration. This District is home to many innovative companies and organisations who've located here to nurture and accelerate growth, improve productivity, and access world-class research and technology from the University. In total, Glasgow's five institutions of higher education and three colleges produce some of Scotland's brightest minds and strong engagement between academia and employers guarantees a robust talent pipeline of employment-ready graduates. The pools of talents and knowledge provided are therefore substantial.

Nonetheless, there seems to be a lack of substantial collaborations between local universities and colleagues, as well as meaningful engagement in the design and delivery of GCRD.

For the former, Glasgow is arguably falling behind Edinburgh and Newcastle in that there is no formal cooperation arrangement set up among the five HEIs and the three colleges. The GCRD has not managed to catalyze this process either as investment projects were designed and led separately by some of the major universities. For example, the University of Glasgow is the anchor institution for the Waterfront and West End Innovation Quarter, which involves approximately £113m investment and covers an area that extends along the river corridor from the City Centre to Govan and northwards to the west-end. University of

Strathclyde, on the other hand, is heading the Glasgow City Innovation District, which includes the creation of Tontine – a thriving business accelerator funded by Glasgow City Region City Deal (£1.67 m), and Barras Art & Design in the East End.

For the latter, our interviewees in the city council all agreed that the engagement of universities tend to be ad hoc and both sides have something to be blamed for – the council for its pressure of swift project delivery and the universities for their slow motto adjustment from the ivory tower model. A further examination of the governance model of GCRD seems to support this (figure 5): the eight member-authority leaders agreed to establish a Joint Committee known as the Glasgow City Region Cabinet, which is represented by a chief executives group, who then monitor the daily operations of the Programme Management Office (PMO). A number of groups support the Cabinet including: the Chief Executives’ Group; Finance Strategy Group; Economic Delivery Group, the Commission on Economic Growth and the Glasgow City Region Economic Leadership Board. The Commission on Economic Growth, chaired by Professor Anton Muscatelli from the University of Glasgow, is the major, and perhaps the only formal arrangement for local university experts for engaged in advising the implementation of the Glasgow City Region City Deal. Four members on this commission are from the UoG, one from UoS, one from Glasgow Centre for Population Health, and the rest are from industries and public sectors (GCRD 2019).

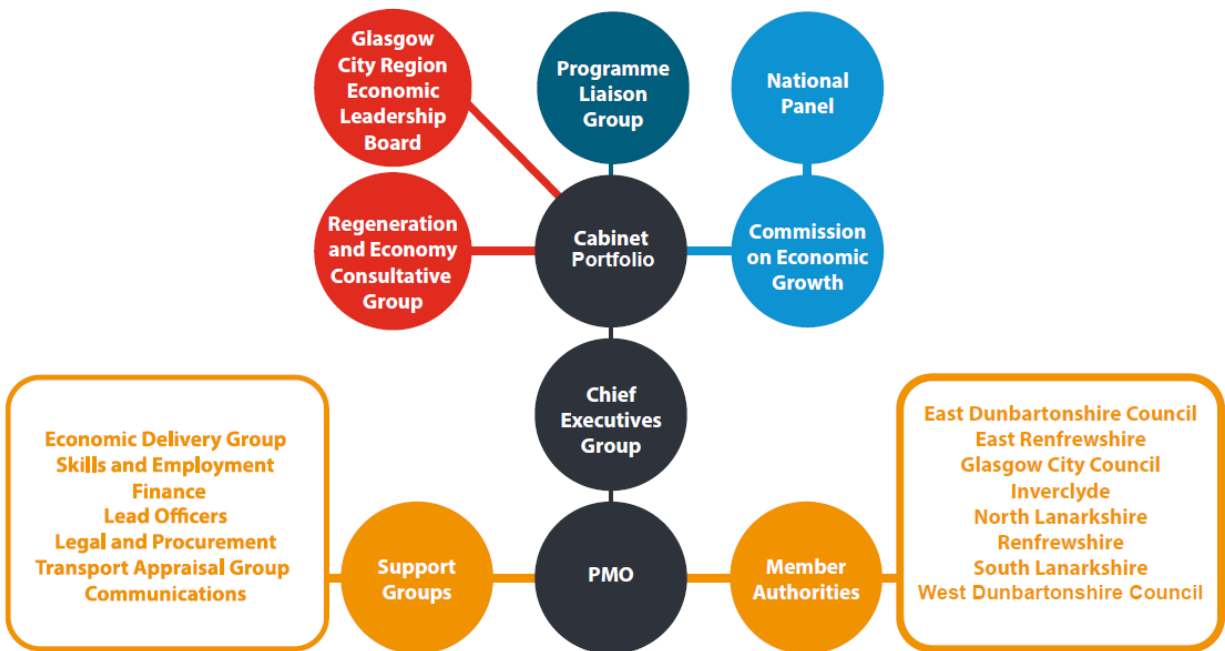


Figure 5: The governance structure of the Glasgow City Region City Deal Programme

Source: GCRD (2017, P10)

Our recommendation therefore, is to build a formal and wider university alliance or network within the GCR which offers a platform for discussion, a space for future thinking and a stepstone for collaborations between universities, and between universities, public sectors, the private sectors and the wider public. The organization structure could borrow from the Edinburgh model, the University Alliance model

(<https://www.unialliance.ac.uk/>) in the UK, or the University 21 model (<https://universitas21.com/>) internationally.

**Observation 4:** Shared challenges in identifying investment priorities

Identifying pillars surrounding the city region's economic strategies have been widely identified as a challenge by our interviewees. There were various approaches in doing this.

Practice in Edinburgh was ad hoc. It doesn't have a regional economic strategy at the moment, and its regional enterprise council was formed after the deal was agreed. The deal is set for 15 years, but our interviewee highlighted the fast-changing political focus which makes it difficult to keep the strategy static. Inclusive growth, for example, 'is currently the buzz word in Scotland. Glasgow has to retrofit that, but retrofitting is always more difficult. We (Edinburgh) are fortunate to catch that term from the start. For us, it was inclusive growth *verse* sustainability, and we went for the former. However at the moment, there is climate emergencies, so sustainability is the new inclusive growth in that sense'. A sophisticated monitoring framework is under developed, and until now, there was a tendency to use external consultant services in Edinburgh.

For Highland, an economic forum provides the main platform for debating and identifying its development priority. This forum meets three times a year, and mainly comprises public bodies such as the Highland council, chaired by its environment and infrastructure development committee, enterprisers, Visit Scotland, National Parties, High-Trans, Skill Development Scotland; Chamber of Commerce, Federation of Small Businesses. Recently its was expanded a bit to include the primary sector, land & estate. One key issue emerged from this forum is digital connection, and recently on talent attraction. The traditional priorities, such as skills, employability, infrastructure, and housing provision, are also frequently disused in these forums. Key sectors identified included tourism, food and drink, life sciences, culture and creative (such as TV, Celtic language, culture events etc.).

In Perth, several wider public consultants and workshops were organized, which invited the private, public, and third sectors to come along. It ended up with larger numbers of projects around 30-40 in the deal. A couple of them emerged from these workshops and made to the head of the term. For example, there is a regional third sector lead training and support for care workers, which, to our interviewee, might not make it to the deal without this opening consulting process.

In Glasgow, priorities were discussed and assembled by individual local authorities. It was more like a restructuring of existing infrastructure projects that were stalled before as a result of funding shortage. In its update of economic strategy, inclusive growth, distribution, engagement and local prosperity were raised high according to our interviewees. The major change brought by the GCRD was the setting up of regional inclusive growth target as mentioned by our interviewee. But without a data monitoring and evaluation framework developed in-house at the moment, future thinking capacity of the city region is limited.

Our recommendation there, is to combine formal project assessment and evaluation with feedbacks sourced from the wider stakeholders and the public. There are already many criticisms of the dominate 'top-down' project implementations in Glasgow's past experience (Buck and While 2017; McCarthy and Pollock 1997;

Mooney 2004). Moreover, to identify the key investment themes, policymakers need to pay attention to both current sector performance and local competitive advantages, as well as to monitor the emerging sectors internationally and forecast what the world's economy is changing. Only in this way can we minimize the potential pains caused by the 'locked-in' effect in the future.

**Observation 5:** Monitoring performance is immature.

Aberdeen is one of the most advanced city council in monitoring their performance, which is now been expanded to cover the city region deal. The initial perfectum of performance monitor came from the fact that Aberdeen was the first city council to issue bond in 2016. Each year the councils needed to get a rating for its credibility which determines its future borrowing capacity. To support this rating, an independent economic policy penal was set up, with the entrust to provide annual commentary on the city's performance. Because the economic of Aberdeen city is deeply related to Aberdeenshire and other hinterlands, the penal's evaluation had always been based on the regional level. one recommendation last year wat to prepare an economic monitoring framework, which covers the broad regional economic strategy and the key delivers of the deal.

To prepare such assessment, the team mainly uses home office data and captures as much as possible indicators, with a focus on key sectors such as oil, food and drink. Once or twice a year, the team will also talk to local stakeholders in order to get their input on the local performance. The most majority data are open-access but some are confidential but local authorities have access to, such as the IDBR information data, which covers business information, employees, sectors and turn overs etc., which enable the team to track sector changes over time. A 'Status of the State' conference is also organsied annually, which is used to launch the report and offers a gathering place for chief officials, politicians, partners of the Scottish Enterprises and the private sectors. More interestingly, the focus of the monitoring exercise also changes according to the needs of the city region. To capture inclusive growth, for example, this team started collecting data on, for example, costs of living, demographic information, immigration data, dependency ratio, housing affordability, key worker benefits and number of children living in poverty. To support the city region deal's ambitious on internalisation, index such as air transport figures, spending, branding, etc., were collected and long-term trend tracked. Although implicitly, there was a logic chain thinking behind data collected.

Our interviewee from Aberdeen however, highlighted the sustained data challenges in fulfilling their tasks. Challenges mentioned include, the data are not up to date (normally 1-2 years old); data coverage is not that good, especially for key themes needed; neither are their accuracy. We were also told that for smaller level, such as the specific projects in the city region deal, it was very difficult to identify their impact through standard measures such as GVA and job created. Sometimes indicators do not capture the right thing, for example using GVA measure gives a sense of economic growth, but it is far from the measure of inclusive growth and wellbeing. More importantly, there was a concern of how to create the right database for the future, as Aberdeen is emphasizing on economic diversification in its city-deal. Yet the potential consequence of diversifying from high-growth or high value-added sectors such as oil, to low-growth ones such as food and drinks, is negative outcome on measures such as GVA and jobs. So how to tell a

compelling story to potential investors around that is challenging. Last but not least, this interviewee pointed out the interdependency between many of the high-level targets such as economic growth and environment; and between national targets and local contributions, such as the carbon neutral objective. Establishing and measuring their individual progress and impact have proven to be really hard.

In Glasgow, a ‘Grand Intelligent Working Group’ was set up around 12 months ago, which brings all the staff involved in data analysis and economic modeling from various departments together. Under this working group, the city council’s intelligent hub is up and running, which is supposed to be the in-house ‘brain’ that could replace the external consultant services. However, we did notice an overwhelming focus on city deal priorities and delivery by this hub through interviews. It is also under staffed and over stretched, since it needs to support the project monitoring for all the eight portfolios. As a result, there is no head-space for future thinking, neither was there any use of logic chain in systemically collecting and understanding the city system functions.

Our recommendation, therefore, is to strengthen the function of this intelligent hub and to set up a long-term strategy for its development. Here the practice and evolution of the New York Mayor’s Office of Data Analytics (d’Almeida 2018) could be a good example.

**Observation 6:** The ‘future work’ we see in other parts of the country is not yet popular in Scotland.

All the interviewees agreed that there was a lack of ‘further thinking’ desire and capacity.

For Aberdeen, where data analysis and economic evaluation is relatively advanced in Scotland, ‘future work’ seems to be narrowly understood as ‘sector work’. Hence we were told that ‘the longer term thing is really the innovation hub, the food and drinks sectors, and economic diversification. These are our long-term goals. Regarding the actual work (delivery), the innovation hub has a lot of things going on in terms of infrastructure’. The same interviewee nonetheless, did notice the needs to reorganise the city council in order to bring people and different sections together.

Edinburgh’s approach is less scientific but more aspirational: it develops a 2050 Edinburgh City Vision (‘Edinburgh being an Inspired City; A Thriving City; A Connected City; and A Fair City’) and a City Plan 2030 (which is still in engagement and consultation stage. The change of the planning system in Scotland might also cause uncertainty to the future direction of this plan). The council has a steering group to oversee the development and implementation of these visions. There was a big public engagement champion organised that had never been done here before, which engaged over 21,000 people and collected over 50,000 visions. Based on these public brain storming, the steering group then organised focused group meetings and consultant meetings with key thinkers and the local schools, to thin down the vision for the city. In the words of this interviewee, what Edinburgh city council got ‘is a vision, not a strategy. It is a bit like the north star, a guiding principle on how decisions are taken. We want to make sure it is the city’s vision not the council’s vision. It is also deliberately long-term in order to avoid political cycles. We then make sure short-term policy decision making is aligned with this vision’. But this interviewee admitted that this vision is only a very simple guild, which needs to be built concrete and implemented by other sectors. Yet in this process, different interpretations, diverse interests, and alignment between different investment

streams, however, might very like emerge. Moreover, this is no vision for the city-regional, and local authorities are still ‘maturing’ in working with each other.

In highland, future thinking is also closely tightened with its major projects. Our interviewee highlighted two important projects here, one is the University’s life science project, which collaborates with private sectors in testing new devices. The other is North Innovation Hub, which accommodates projects on digital connection and knowledge economy. This interviewee, nonetheless, did reflect on the future impact of a ‘carbon neutral’ society for Highland, especially when less and less young people are willing to drive and when automatic driving cars start to prevalence, as all these have significant implications for the tourist industry in Highland city region. Similarly, in Perth, the chief management group just started looking at AI, and what does its wider usage mean for the local job market, as its major local employers – the SSE for example – employs a large number of lower paid, less skilled jobs. These was an urge to understand the potential impact caused by such technology shock.

Nonetheless, in both cases, further thinking was conducted in a piecemeal and/or causal manner without solid analytical foundations. Interviewee in Perth mentioned that one reason was their lack of heavy-weight intelligent capacity compared to other cities, such as Glasgow. But how is Glasgow doing in this regard?

Our primiparity analysis revealed a less optimistic picture. The Glasgow Intelligent Hub, for example, was established specifically to offer in-house thinking capacity to local authorities. But even with this hub, ‘future work’ is highly limited, and its work has been delivered ‘ad hoc’, responding to demands from the eight project portfolios. Therefore instead of functioning as a future ‘think-tank’, as the ‘New Economy’ does for Great Manchester Combined Authority, and the ‘embedded activist’ does for the Mayor of Bristol, the Glasgow Intelligent Hub is more of a project monitor and data analyst on what is happening now.

Several reasons emerged as accountable for this lack of future work:

- Resource cut, as mentioned before, has caused a 20% budget gap in Glasgow. Officials and bureaucrats have to ‘put their head down; working hard to deliver more things’.
- There is a limited culture in ‘big picture thinking’. Decentralization and localization have cultivated a silo working attitude for a long time both within the city council and across the city region. There was no cross-departmental ‘brain storming’ sessions for example within the GCC. On the regional level, all sorts of departments are over-seeing different functions, which often fight with each other, less alone talk to and collaborate with each other.
- There is an immature partnership on the city region level. we were told many times that, even having the leaders and chief executives to sit down and talk to each other is a big progress. We were also reminded frequently that sharing services are still regarded by many localities as a job threat. Education to local authorities on the benefits and reason of regional working, therefore, is called for.
- Public institutions face the problem of aging and memory losing. On the one hand, jobs in the local governments are not regarded as privilege as before among young people. Senior leaders therefore are often promoted internally who have been working in the same institution for their whole life. On the other hand, many middle-aged officials and politicians were laid off as a result of budget cut. Their working experience, knowledge and ‘best practice’ are also lost in this process.
- Quality data are still a major challenge in modelling future scenarios. They are often desegregated; out of data; not all covered; and not all accurate. External consultants used to be the favorite knowledge

inputs. But now there is a reducing resource and appetite to use them. Universities could help to overcome some of these constraints; but they are not on the radar of policy makers as yet.

Our recommendation therefore, is to start educating employees and partners the importance and added-value of working together on the regional level. Changing the institutional culture will be difficult but still possible if a strong leadership team is driving this forward. Local universities should be leveraged fully in the 'future work' and in providing future proofing trainings, cutting-edge research and talent attractions.

## 5. Final note: Smart – Not Enough

Within the realms of policymaking, there is a growing interest in approaching city management through the development of 'smart cities': cities that embed emerging information technologies in systems management and decisions. These interests are enabled by new policy autonomies for cities and at the same time the new systems of information management. Yet our report argues for a fully smart approach, which views our cities as intelligent, learning systems that make best use of available data, but also embraces the reality of conflict and different views on what we know, how we know it, and what this implies for future actions.

This poses challenges and a new research agenda for policy knowledge that involves:

- The ways in which evidence, analysis and now big data can inform city policy; an audit of how knowledge, and what knowledge, is used in city policy making (*very much project-based in our study*);
- The processes and systems by which city bureaucrats and leaders learn about 'city' issues; resource commitments to learning and research, structures for absorption and development of ideas (*very limited energy and resource devoted to this learning process at the moment*);
- The nature of the knowledge ecology within metropolitan areas - what shapes it and how Big Data might impact it (*the public sector knowledge ecology is incomplete, aging and forgotten; few in-house data analysis and processing capacity in using and understating big data*);
- The identification of local sources of 'creation' of knowledge and the roles of co-production with city governments: the potentially key roles of universities, think tanks etc. (*local universities are started to get involved but there are still room for improvement; within the public sector, however, there is hardly any co-production activities*);
- An assessment of the structures, spaces, networks, 'buzz' stimulators etc. that shape effective knowledge ecologies for city governments, and a better understanding of academic 'impact' and innovation pathways (*mainly ad hoc responding at the moment; universities should take a lead here, be more proactive and civic than before*);
- The 'internal' knowledge transmission mechanisms deployed within large scale metropolitan governments (*highly limited vertically and horizontally; yet city deals start to bring leaders together*);
- Assessing how knowledge is shared with communities, voters/citizens, civil society (*superficial knowledge sharing and public engagement at the moment; need to reflect on governance structure*);
- Identifying key priorities for better knowledge strategies within city governments (*mainly based on city region's existing economic structure; shaped by national priority as well*);



There are, of course, many issues and questions that need to be pursued in city region's future thinking. To be qualified as a fully smart city, policymakers, in partner with universities, other national and local agencies, private and third sectors etc., need to at least pause and reflect on the key challenges ahead and different scenarios available for their growth. There is also a need to cultivate a city-regional smart thinking system featuring a scientific logic chain and feedback loops. With many city regions now are refreshing their economic strategies, we think the time is right to include a future proofing work into their reflection exercises.

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**Title:**

Governing the Intelligent Metropolis

**Date:**

2019-11-01

**Citation:**

Miao, J. T., Maclennan, D. & Muckersie, A. (2019). Governing the Intelligent Metropolis. Commission for Economic Growth, Glasgow City-Region.

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