

Cybernetics and The Intelligent City

John Beckford, Chris Heald, Chris Murray, Robert Rogerson

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*UN SDG goal 11 is key to **achieving** all of the Global Goals! (The Global Goals, 2023)*

Introduction

This paper sets out to explore the challenges facing cities and to consider how insights from cybernetics might help us to develop them as intelligent, adaptive systems, recognizing their inherent complexity and dynamism. This means thinking about them as evolutionary living places rather than static, bureaucratic entities.

The urban holy grail

Cities are now the primary human habitat and growing. According to the World Bank, 56% of the World's population live in cities (ref 1). This is set to rise to 70% by 2058. Yet in 1900 only 14% of the global population was urban, and in 1800 just 3%. This represents a massive adaptation in the way we live, alongside increasing technological, societal, and environmental shifts. The future of our species is therefore closely linked to the success of our cities, and we should repeatedly ask whether the tools, the policy, and governance systems available to the leaders of cities are the right ones for the challenge.

The UK is already highly urbanised, with over 80% of the population living in cities (83% in England; ref 2); a figure which will further increase. Large towns and cities take up 9% of the UK landmass, generate near to 70% of wealth by output and 60% of jobs. Although urban and regional policy has taken quite an experimental and radical approach over the last 30 years, with regionalisation and devolution at the fore, this is widely considered an incomplete and unresolved picture. As the UK looks to its cities to help address major challenges – post-Covid, climate, productivity, deprivation, homelessness, digital exclusion, energy poverty, diversity – there is an opportunity to fundamentally review the role, governance structures, and tools available to those in leadership positions (including but looking beyond local authorities, operating across all sectors and layers of local communities).

Making cities and their urban systems and infrastructure resilient to external shocks, and sustainable over the long term to shifts in the wider economic, social and political contexts in which they operate has long been the holy grail sought by those who seek to manage them. From the devastating impacts of disease and famine that wiped out

early meso-American urban civilizations such as Teotihuacan in 650AD, to war and civil unrest that undermined Romano-European regimes and led to the destruction of their urban systems – not to mention the impact of natural disasters and man-made problems like cholera linked to poor sanitation – the city and its systems have been susceptible to dramatic change.

In contemporary times, and with a focus on the UK, national and devolved governments have sought to find ways in which cities – large and small – can be more resilient and stable, and have systems and infrastructure that creates a safe, sustainable, equitable and liveable environment for citizens and those who depend on the urban system for their livelihoods.

Passing the baton to cities

In their search for a solution, national government has shifted the focus of decision-making. Recognising the challenges of over-centralised governance (Ref 3) there has been a shift towards sub-national government and governance being given greater prominence as the level at which sustainable and resilient solutions can be found and enacted. In taking this perspective, emphasis to date has been on the creation of alternative approaches to governance, working across national and local settings to form common agendas for promoting and supporting sustainable living. Initiatives, such as the Levelling Up programme in England and Wales, and City Deals have created new forms of multilevel and experimental governance where local and place-based bottom-up approaches interact with national and policy-driven top-down approaches. Although sensitive to individual geographic contexts, they remain constrained within primarily national (economic and political) agendas with local governance partners forced into a largely reactive role.

Our central hypothesis is that effective place-based policy needs to be derived from a more inclusive approach including:

- decision-making and prioritisation based on active engagement and democratic participation with equity at its heart;
- strengthened local autonomy so participation can result in direct change (i.e. not waiting for national permissions);
- communities and non-government local partners are able to co-produce policy and initiatives; and
- local accountability based on democratic processes and institutions, but not limited to these.

But in suggesting this there is a fundamental challenge.

Looking across the political spectrum and in the current economic climate, there is likely to be an expectation that those managing cities and their urban regions will be required to do MORE and get better value for money, but to do so with LESS – or at best, the same – resource base. And probably with limited additional executive clout and legislative power to enact any solutions.

It is this challenge which forms the basis of this discussion paper and our related conversations.

- How can the management of cities be smarter, more intelligent, make more from the same and yet make cities more sustainable and resilient?
- What has to change in the management and governance of cities and in public engagement to enable this?
- Who has to be involved in such change to make it effective, and who has to lead the process?



- How can the inevitable tensions between local and central governance and policy be managed?
- What are the barriers within the current urban systems and in national policy which might prevent such change or reduce its effectiveness?

New thinking

In attempting to answer some of these questions, our aim is to explore how a focus on the notion of the **intelligent city** and **cybernetic thinking** might assist.

To stimulate this debate, this paper sets out some key elements we believe are critical to enable change in both the notion of an intelligent city and in cybernetics. The next section outlines what we mean by these two terms, both of which have been described as ambiguous. And finally, we outline how we hope to take forward the discussions and enact the ideas, arguing for new research to consider how cities – including those with some devolved power and governance such as those in City Deals and Mayoral government, and those without such local ‘autonomy’ – can demonstrate how being more intelligent, smarter and more system-focused might assist in achieving the elusive holy grail.

Cybernetics? Isn't that just robots?

Cybernetic philosophy stretches back to Plato in around 390 BC (Ref 4) who used the term, ‘kybernetes’ to describe the ‘steersman guiding the ship of state across the harbour to its destination’, an analogy for the process and structure of governance. The purpose of the steersman is to reach a destination (achieve a goal or fulfil a purpose) using information about variance from the goal, the trajectory and the varying external influences of tide and wind to adapt the direction of the craft until purpose is achieved.

In the intervening 2,400 years or so, cybernetics has evolved and been applied to numerous different systems. In our modern world it is the ability cybernetics offers us in grappling with enormous volumes of rapidly changing data in the field of information management, machine learning and artificial intelligence which makes it most relevant.

Although analogous, it is evident how the notion of cybernetics as the steersman helping us reach a destination of sustainable cities remains an essential bedrock of effective governance. Systems suitable for cybernetic consideration and inquiry are: purposeful, complex, dynamic, self-regulating with high autonomy – a set of characteristics that can be seen in every city.

Contemporary cybernetics offers a way of thinking about organisations as adaptive eco-systems. Such systems exchange information with the actors and activities in their environment and use that information to guide and steer the organisation, adapting itself to the context and adapting the context to itself. The context is the complex set of relationships within which our city exists – local electors, officers, interest groups and businesses and higher order governmental bodies, both elected and not, which have power to constrain the local.

Practically applying this thinking does not mean abandoning all of the requisite bureaucracy essential to the maintenance of order and delivery of services. It does mean rethinking the roles and often the behaviours of elected members and officers, it does mean rethinking both what services are delivered and how they are delivered. It



requires a focus on outcomes – the things we want to achieve – rather than inputs – the things we purport to control. Cybernetics requires, in this instance, a focus on the outcome for the citizen with the organisational processes and structures developed backwards from those outcomes. That will challenge the typically top down, hierarchical, budget accountability driven, internally focused structure commonly adopted in governance of public and private sector bodies.

The effect of developing such alternative approaches is to increase the effectiveness and efficiency of the bodies delivering services. A clear focus on desired outcomes enables recognition of those things which are not working and their redesign or abandonment. Substantially redesigning the ways in which we capture, process and use information in our decision processes enables us to increase both the speed of decision making and its effectiveness. In applying these ideas in a variety of organisations over many years, performance gains of more than 10% are commonly achievable with much larger numbers seen in some circumstances particularly where information systems are effectively deployed.

The Intelligent City

The concept of Smart Cities (utilising technology and data-driven advances) has been widely adopted, particularly in the global north, and adds significant value to the urban experience. The innovative city builds on this, through a confluence of informed place-leadership, rapidly evolving technology and access to new investment streams (Ref 5). The notion of an ‘intelligent’ city proposes a further evolution, as an adaptive, people-centred model of organisation and governance.

People centred because in thinking about cities the seductive technology, infrastructure and top-down plan of the place can obscure what cities really are; big collections of people and their complex behaviours driven by emotion as much as logic, who’s needs can only be fully understood by considering the grassroots requirements and point of delivery.

Adaptive because when change is constant, shifting from model 1 to model 2 to model 3 and beyond of anything just doesn’t work anymore. A model of organisation can only respond if it is designed and constructed to be flexible and adaptive. In this respect, the global north may have much to learn from emerging communities such as from informal settlements whose development is perhaps more organic, and from community-led governance that has filled a gap where the state may have been absent. Cybernetics offers such an organisational model through Beckford’s Intelligent Organisation (Ref 6).

Identifying urban solutions

Cities are critical to solving the biggest issues the nation and the world now face. They are, relatively, human in scale and, relatively, close to the needs and desires of citizens and certainly much more so than central governments. Most carbon emissions come from cities, but they are also the place where solutions lie – density, smart mobility, housing retrofit. They are the scale at which changes are taking place as we adjust to the post-Covid pandemic. While footfall is returning to most cities, our relationship with urban living and working has undoubtedly changed. Home working, public transport use (also related to the quality of infrastructure) and online retail have all impacted how we live. Our reasons for visiting centres are becoming more experiential and successful urban living requires



access to high quality amenities and green space. In turn these changes re-energise the concept of the 15-minute neighbourhood, but with extra questions about whether that might only work for affluent areas, leaving other neighbourhoods even further behind?

Our contention is that a similar shift in the scale of policy is needed. National policy responses to some of the challenges over the last two decades began with the creation of a regional architecture intended to shift power away from the centre, and although this has significant successes, it still did not place control in the hands of local community, democratic and business leaders. This was followed by a drive toward devolution over last decade or so starting with City Deals, the formation of Combined Authorities in England, and deals for other tiers of local government, accelerating some greater local collaboration. But this can better be described as 'functional' devolution; a decentralisation of some responsibilities and some of the powers and budgets to go with them, but not devolution in terms of increased local fiscal control that is generally seen in developed nations. A tiny fraction of the local fiscal base is in constrained local control in the UK.

Solutions can't be delivered by nations alone – or indeed by citizens and communities. The issues of the 21st century are too complex to do top down and too systemic to be resolved by local bottom up actions.

So, where might there be a link to cybernetics? A city is a complex set of systems, under multiple agency and actor controls, and despite some very good attempts, cybernetics and systems thinking has not been widely applied. Specifically, we aim to explore what an adaptive urban eco system might look like, how would it operate, what are its principles and primary tools?

So what?

To repeat, our central hypothesis is that effective place-based sustainability policy needs to be derived from a more inclusive approach including:

- decision-making and prioritisation based on active engagement and democratic participation with equity at its heart;
- strengthened local autonomy so participation can result in direct change (i.e., not waiting for national permissions);
- communities and non-government local partners are able to co-produce policy and initiatives; and, local accountability based on democratic processes and institutions, but not limited to these.

So, what should we do about it?

The principals are straightforward, we must:

Make those 'what' policy decisions at a centralized (national) level that can only be made at that level e.g., those things which enable and support equitable outcomes for all citizens including policy on defence and the overall direction of education, social care, health etc (accepting that local health disparities, care and education requirements require tailored local responses);

Devolve decision making to authorities local to areas for the 'how' of national policies and the 'what and how' of devolved matters;



Hold each authority and each level to account for the fulfilment of its purpose and delivery of its objectives

Enable both effectiveness and efficiency through the adoption of a digital transformation of the requisite bureaucracy; i.e. digitally delivered administrative systems which themselves must be designed to be more effective and efficient than their current, paper-based equivalents;

This will require action by these distinct groups:

A deepened political understanding of the underlying needs and desires of members of society, alongside an ability to respond long term, not only reactively (for example on issues of prevention or major infrastructure);

Policy makers and public servants must translate those needs and desires into deliverable outcomes through renewed, more agile bureaucratic and other systems;

The governance (political and administrative) of resources and delivery processes must improve responsiveness to local needs and circumstances;

Citizens must engage (and be encouraged to engage) in the processes and discussions that drive democratic outcomes, enabling them to hold politicians to account in converting policy to action.

Researchers in both the philosophy and practice of city governance should identify and work on the challenges that will emerge from this provocation.

These principals and actions can all be built on and developed from changes which are already in course and gaining traction such as integrated health and social care, devolution trail blazers and innovation policy. What will be required to enable that is that the groups identified need to become aware of and engage with the world of alternative possible futures that emerge through the cybernetic insights to the realization of The Intelligent City.

We invite you to engage with us, to comment on this paper, to make your own suggestions, to help us develop an agenda for research and practice to deliver the Intelligent City.

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Contact Information:

Email: John Beckford: john.beckford@beckfordconsulting.com

Web: <https://beckfordconsulting.com/>

Email: Chris Heald: cheald@potentialpartnership.com

Email: Chris Murray: chris.murray@urbanpsyche.org

Web : <https://www.urbanpsyche.org>

Email: Robert Rogerson: r.j.rogerson@strath.ac.uk

Web: <https://rjrogerson.weebly.com/>

