4D HYPERLOCAL

A Cultural Toolkit for the Open-Source City

Guest-Edited by LUCY BULLIVANT

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Lucy Bullivant PhD Hon FRIBA is a cultural historian, award-winning author, a Built Environment Expert (BEE) for Design Council Cabe, London, and founder and Creative Director of Urbanista.org, a webzine on liveable urbanism. In 2010 she was elected an Honorary Fellow of the Royal Institute of British Architects (RIBA) for her services to architectural culture globally, and she received her PhD by Prior Output for ‘From Masterplanning to Adaptive Planning: Understanding the Contemporary Tools and Processes for Civic Urban Order’ from the Sir John Cass School of Art, Architecture and Design at London Metropolitan University in 2015. She was a professor of urban design history and theory for Syracuse University (2013–14), and a jury member for ArchMarathon, Milan (2014 and 2015–16). She has been a member of the Scientific and Steering Committee, Institut pour la Ville en Mouvement, Paris since 2011 and of the Comité Technique at FRAC, Orléans since 2010.

Lucy’s research topics include alternative masterplanning and adaptive frameworks; relational urbanism and social equity in the formal and informal city; hyperlocal digital–physical strategies; and urban imaginaries. She is the guest-editor of the 4dspace: Interactive Architecture (Jan/Feb 2005) and 4dsocial: Interactive Design Environments (July/August 2007). In this issue she explores the different manifestations and implications of emerging hyperlocal modes of design using geolocal technologies. This ecology of adaptable tools, platforms and networks is more than a domain of design specialists; it facilitates a wider engagement in local contexts, with projects and strategies promoting a more inclusive commons based on distributed participatory systems – a cultural toolkit for open-source urbanism.


Her books include Masterplanning Futures (Routledge, 2012), which was Book of the Year at the Urban Design Awards, 2014; Recoded City: Co-creating Urban Futures (Routledge, 2015), on participatory placemaking and co-authored with Thomas Ermacora; New Arcadians: Emerging UK Architects (Merrell, 2012); Responsive Environments: Architecture, Art and Design (V&amp;A Contemporary, 2006); and Anglo Files: UK Architecture’s Rising Generation (Thames & Hudson, 2005). Lucy is an editor of publications on aspects of the relationship between architecture, design, digital technology and society, including bio_Tallinn (Tallinn Biennale of Architecture, 2017) and Sustainable Urbanism (University of Qatar, 2016). Her investigative journalism has been published in the Cities and International Development sections of The Guardian, and she has been writing features for leading specialist architecture and design media since 1987, including Domus, Volume, Harvard Design Magazine, Architectural Review, Architecture Today, A+U, Uncube, Platform, Indesign, Habitus, The Architect’s Newspaper, Metropolis and The Plan.
The hyperlocal is indicative of a particular mindset. Enabled by digital tools and open-source activities, it is a social ecology due to the fact that it is underpinned by a belief that on-the-ground engagement and shared resources are of fundamental benefit to the evolution of communities and cities. The challenges of urbanisation globally since the 1960s, and the social myopia of many top-down urban developments, have encouraged alternative models to be forged as part of a wider commitment to cultural self-determination.

Advances in tech culture of the last decade or so have opened up many potent possibilities for individuals and groups to co-create and apply their own tools to urban needs. This issue of *Design* explores the plural characteristics, significance and uses of the hyperlocal as an emerging form of digitally facilitated – or four-dimensional – design. These are taking shape at a time of many civic-tech innovations, ranging from municipal governments opening up their data to improve quality of life (and making better use of it themselves), helping to break down silos and forge dialogues between different stakeholders, to driverless trains with the potential to remove human error.

The hyperlocal’s community value is growing in areas ranging from medicine to urban design, environmental resources to information sharing. As a field of actions and distributed capacities for social infrastructure it is greatly at variance with the narrow vision of industry-driven, smart-city urban development. The repertoire of the latter deploys Internet of Things sensors and actuators to collect, in an unconstrained way, data...
about energy and transport that can be analysed to efficiently manage complex urban systems. Rather than being a generic ‘tech kit’, the hyperlocal’s emerging, alternative toolsets respond to specific commons (public localities). Their value is incalculable in contexts where digital connections are not ubiquitous, such as Brooklyn’s Red Hook neighbourhood, or Rwanda in Africa, or simply where community-led digital platforms are new forms of social infrastructure. Being co-designed and experimental, they open up possibilities for action and communication.

The malleable, shared environment of hyperlocal platforms has value because each is customised and dependent on the capacities of participants on the ground, rather than on external forces, to adapt them and direct their potentials. In smart urban-tech innovations, the focus is on speed, efficiency and control, but there is a huge need for democratic alternatives that represent ‘a legitimate platform for the negotiation of complex factors’, as architect Indy Johar, cofounder of Architecture 00, argues. As he points out, ‘many of our civic-tech innovations seek to make direct democracy faster and more efficient – not necessarily smarter or wiser. They digitally enhance our reactive intelligence rather than the quality of representative democracy and our reflective and collective deep intelligences as a society’.

In his article in this issue of Δ, ‘Practices of the Minimum Viable Utopia’ (pp 16–25), Adam Greenfield proposes that urban design must offload the ‘dinosaurian’ concept of the smart city that dominates its discourse and fetishises data, in favour of approaches that leverage technology but are not driven by it, where production is based on participation, ‘democratising the ability to make useful things’. The layers of an interactive map built from time-based satellite imagery, for example, are not embedded with neutral data, but need critical analysis. This is exemplified in the work of Laura Kurgan and the Center for Spatial Research at Columbia University (pp 72–7) in the tragic context of Aleppo in Syria, which aims to reframe the narratives of the violence of war and its effects on cities and their communities.

Cities are interfaces open to interaction, and are therefore also hackable, or open to appropriation, write Martijn de Waal, Michiel de Lange and Matthijs Bouw in their analysis of collaborative citymaking (pp 50–57). They suggest that hackers alone should not contribute to systemic change, and that institutions such as local municipalities embedded within society must create policies that support public interests. Their Hackable City research reveals common strategies behind various hyperlocal models that frame and nurture new relationships and democratic practices.

All hyperlocal processes are defined by algorithms that, according to writer Paul Currion, are ‘only a set of step-by-step instructions for carrying out a task’. The work of coding needs to reflect the values necessary for open-source projects, which presents a challenge for design/management teams. In evaluating the increasing application of algorithms in humanitarian projects in combination with automation, Currion concludes that such a formula will fail to build an adequate transactional model for this field: ‘Rather than be overtaken by software companies, we may need to become software companies – otherwise our lack of computer literacy means that the coding is going to be left to the hyperactive imagination of the hackathon.’


Red Hook WiFi provides free Internet access to local residents in an area with low broadband adoption rates, to close the digital divide. Its ‘digital stewards’, young adults aged between 19 and 24, promote the network’s wider use by locals to support their lives, and the use of technology to promote community development more widely. Here three stewards check an outdoor router on the roof of the non-profit organisation.
Hyperlocal networks and apps are collaboratively designed to enable peer communities to advance local interests by sharing human and physical resources.

As architect Usman Haque argues in ‘VoiceOver: Citizen Empowerment Through Cultural Infrastructure’ (pp 86–91), the rules behind the design of smart systems are all too often made behind closed doors, when it is citizens who need to be involved collectively in helping to shape society’s algorithms. At their best, as his VoiceOver project in County Durham in the north of England demonstrates, hyperlocal networks and apps are collaboratively designed to enable peer communities to advance local interests by sharing human and physical resources.

Digital connectivity in rural villages extends a sense of community to a network beyond relatively isolated environments, maintains Katharine Willis in her article in this issue (pp 92–9), while in underprivileged urban centres many local programmes aim to close the digital divide and promote social connections through access to services and economic opportunities. When Hurricane Sandy struck the US in 2012, for example, severely limiting online access, the existing public Red Hook WiFi network for an isolated community in Brooklyn, New York, became a vital means of getting supplies and locating government aid workers. A mesh network still operating today, it uses decentralised technology, so that its nodes of routers sited on roofs as well as inside buildings can function when not connected to the Internet. A network with social incentives including a mapping platform, Red Hook WiFi relies on ‘digital stewards’, local young people who foster its functionality and maintain it with wholly open-source resources and software.

The Rise of the Geolocal
In the last few years the grassroots amenity of the hyperlocal has become strongly reflected in the information-sharing role of smartphones and social media in street protests such as the Arab Spring (triggered in Tunisia in 2010) and the global Occupy movement (from 2009 onwards), and by refugees sharing directions as they attempt to cross countries. An unprecedented number of people now make use of the high degree of precision about physical location that smartphones offer. In developing nations, usage of the device skyrocketed from 21 per cent of the population in 2013 to 37 per cent in 2015. In China in 2015 this was 52 per cent; and in the US 72 per cent. An enormous amount of content available via the Internet can now be accessed and consumed from our phones.

While social media has been more recently buoyed by the development of the sharing economy and ecommerce, and the rise in blogs, it was in the late 1990s that websites first fostered multimedia, followed by rapid evolution in mobile content and applications around 2000. Digital platforms now have the capacity for their hyperlocal content to be created, distributed and managed in a more automated way, enabling a range of new perceptions and engagements. The growing extent of possibilities and motivation to manifest new functionalities is such that there is a greater focus on the distribution and sharing of information about daily life than on its quality.

The hyperlocal brings unknown aspects and layers of environmental features and characteristics into view, but who owns the unprecedented amount of data being mined daily by individuals and groups, hobbyists and professionals? The increasing popularity of ‘checking in’ to locations through...
Rwanda’s population = 11.78 million. Covering 5.2 million people

44% of the country’s population with 3 buildings by 2019
Clay and boulders – are locally sourced raw materials – are delivered to site, the Droneport's fabrication shop, postal room – an ecommerce trading hub and workshop where local people can manufacture drones.

The proposed network of drone routes connects three Droneport locations with district hospitals. It would enable urgent and precious supplies, particularly blood, to be delivered to remote areas on a massive scale, giving support to 5.2 million people, 44 per cent of Rwanda’s population of 11.78 million. The existing skeletal road network covers just a fraction of the country, while only a third of Africans in rural areas live within 2 kilometres (1.2 miles) of an all-season road.

The construction sequence of an all-season road.

Africans in rural areas live within 2 kilometres (1.2 miles) of an all-season road.

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The construction sequence of the new Droneport building typology, an emblematic vaulted brick structure. Imagined as a kit-of-parts for which only the basic formwork and brick press machinery are delivered to site, the Droneport's raw materials – clay and boulders – are locally sourced.

Platforms and Toolsets for Navigating Complexity

Geolocal capacities are an immense resource for architects and urban planners to encode participatory parameters into their designs. As architects Will Gowland and Samantha Lee of UniversalAssemblyUnit argue in ‘Ω 4D Hyperlocal Would Like to Use Your Current Location’ (pp 104–9), the hyperlocal needs to develop its narratives through a bottom-up approach to GPS and real-time locating systems. Their visualisation apps provoke an alternative relationship to place, communication and social interaction to better suit user needs. The playful interactive ‘Sentiment Architectures’ systems and tools designed by Moritz Behrens (pp 98–103) develop the behavioural qualities of the urban mediascape, and boost public discourse by enabling citizens to directly express their feelings and views about civic concerns. Building multilayered visual representations of the city from social media imagery, for example Instagram posts, reveals their uneven distributions, as illustrated in the work of Lev Manovich and Agustin Indaco (pp 110–17), and is an incisive way for architects and planners to analyse urban environments to see how they change over time.

Multidisciplinary teams can change the stakes of a whole community by creating a culture of self-organisation, to share data, regenerate vacant spaces, implement local systems of upcycling and resources, and to crowdfund. Local platforms have recently been co-created by groups of resident activists, architectural and urban designers and planners such as Ecosistema Urbano and Saskia Beer. The ZO!City project, which Beer discusses in her article on pages 58–63, led to the founding of the TransformCity online urban transformation platform for the district of Amstel3 in Amsterdam, supported by a distributed network structure. It is a digital tool that catalyses a sense of ownership for community members. While TransformCity enlightens other groups, Beer maintains that each platform must be made context-specific through local customisation.

The leveraging of environmental data by designers to empower citizens in their grasp of their built environments is possible by engaging the communicative and co-creative potential of such information. Until now, top-down simulation procedures of 3D urban observatories have produced results that are sometimes even difficult for architects and planners to understand. However, through the new generation of interactive hybrid-reality projective urban lab platforms that architect Bess Krietemeyer and colleagues at the Syracuse Center of Excellence in New York are developing as public exhibits (pp 36–43), a wide range of users can experience and analyse bioclimatic ambient energy flows and impacts. More intuitive perspectives of data and unconventional modes of visualisation elicit visitors’ responses that become part of a library of open-source data.

Augmented Urbanism and Regional Infrastructures

Architects identify with hyperlocal processes because they introduce flexibility into design and transcend limitations in connectivity and programme through concrete demonstration of new alternatives. The geolocal, or locative media, bring versatility to architectural investigations of a fragmented, neglected area of the city like Segrate in Milan, writes Raffaele Pe (pp 78–85). They make places easier to navigate, and build perceptive capacities into the flow of information, freely creating knowledge and uniting a historical and geographical sense of belonging.

In contexts without adequate road and rail infrastructure such as rural Africa, the advantage offered by drones, or unmanned aerial vehicle (UAV) technology, is based on a bespoke connectivity and responsiveness to the needs of civil society. In 2011, a team of designers, engineers, computer programmers and entrepreneurs at the Singularity University, a public benefit corporation, developed networks of cheap cargo drones capable of transcending geographic barriers for humanitarian uses to carry urgent packages between base stations. These have since evolved as free prototypes by ARIA, a firm producing open-source autonomous logistics infrastructure, which was cofounded by one of the original team members, designer Arturo Pelayo. Foster + Partners, design for a Droneport in Rwanda, for example, introduces a new building typology that will be used for the transfer, via unmanned flying vehicles, of blood and other medical supplies to treat people with preventable diseases in remote areas. The intention is to create an entire drone network of Droneports, each including a health clinic, digital fabrication shop, postal room – an ecommerce trading hub and workshop where local people can manufacture drones.
UAV/drone technology is used not just to film and photograph urban sites, but to create 3D site models and map their different material ecologies, as the work of New York-based aerial video production company Marvel Vision demonstrates. UAVs enable digital mapping, largely due to programmability and range, and their GPS capabilities mean the maps are also geospatially accurate. They can therefore be programmed to survey a plot of land and create a digital 3D model, using photogrammetry combining photos and providing information such as distances between points, elevations of terrain and volumes of earth and structures. A young industry, UAVs have already significantly disrupted agriculture, development and energy, according to Pablo Marvel, CEO and cofounder of Marvel Vision: ‘The true success and innovation will come from understanding this new aerial platform, and applying other softwares and technologies to find entirely new solutions.’5

Distributed Technologies
Hyperlocalism – thanks to collective intelligence enabled through open-source design – departs from traditional deterministic, purely scientific approaches. It enables planning and urban analysis to become relational and able to bridge the gap between resources that are tangible and measurable, and those that are not, through adaptive frameworks that demonstrate how multiple aspects of reality can be interacted with. Technologies are now an integral part of urban commons, and as such highly politically relevant to their identities as places with widely spread resources. This is maintained by Alejandro Zaera-Polo in his article ‘The Posthuman City: Imminent Urban Commons’ (pp 26–35), whose algorithmically responsive design processes incorporate climatic, environmental, programmatic and financial performances. Digital scanning and tracking and real-time feedback from these can create an adaptive substratum of open networks and improve the resilience of biodigital material systems, capacities Claudio Pasquero and Marco Poletto of ecoLogicStudio apply in their Solana Open Aviary project at a man-made nature reserve in Montenegro (see pp 44–9).

WXY architecture + urban design used Tygron Engine 3D modelling for their Gowanus Canal–Newtown Creek surge barrier project to obtain live intelligence on the impacts of different flood-protection scenarios. The study combines 3D visualisation and real-time feedback to support stakeholder discussions and negotiations on planning questions and possible outcomes. Similar to a gaming engine, the platform integrates GIS data layers, and not only allows stakeholders to test the implementation of alternative flood protection systems, but also to visualise how each intervention relates to its physical context, and the tradeoffs associated with each option. The Engine synthesises flood-map data, flood-protection intervention location data, and land-use data to inform users of how many residents and jobs are protected by a given scheme.

Locality and the Interdependency of Things
The Pokémon Go game, the first popular example of augmented reality using GPS location mapping, transforms the way players experience their local environments together. As one reviewer observed: ‘For 21 million of you [reported numbers who bought the game on its release in July 2016], a game layer over a map of your city just became more useable than the map itself.’6
Marvel Vision, Antique aqueducts of the Piedras River, San Juan, Puerto Rico, 2016

An orthomosaic, a collage of hundreds of bird's-eye-view photos taken from a drone (UAV), which also enables digital mapping. Innovation in the use of drone footage of urban sites is increasingly supporting masterplanning, but also enables 3D site models to be constructed in a new way.


A maximum-precision 3D site model of Hull House, created as part of Marvel Vision’s urban planning research by stitching GPS-embedded photos together to give accurate X, Y and Z placement.