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Photos: GLOW Eindhoven; Lars van den Brink (above)

Climate Future and the Digital Civic Universe

This article sets forth the proposition for a digital civic universe (DCU) as a both common data ontology and a hybrid spatial medium for integrating the three and four dimensions of state-sponsored climate adaptation plans, civic adaptation realities and design interventions in the built environment. The authors, taking the U.S. as example, state that City Adaptation Maps (CAM) and National Adaptation Maps (NAM) conceptualized as a DCU platform could offer new ways for designing an adaptive and sustainable future.

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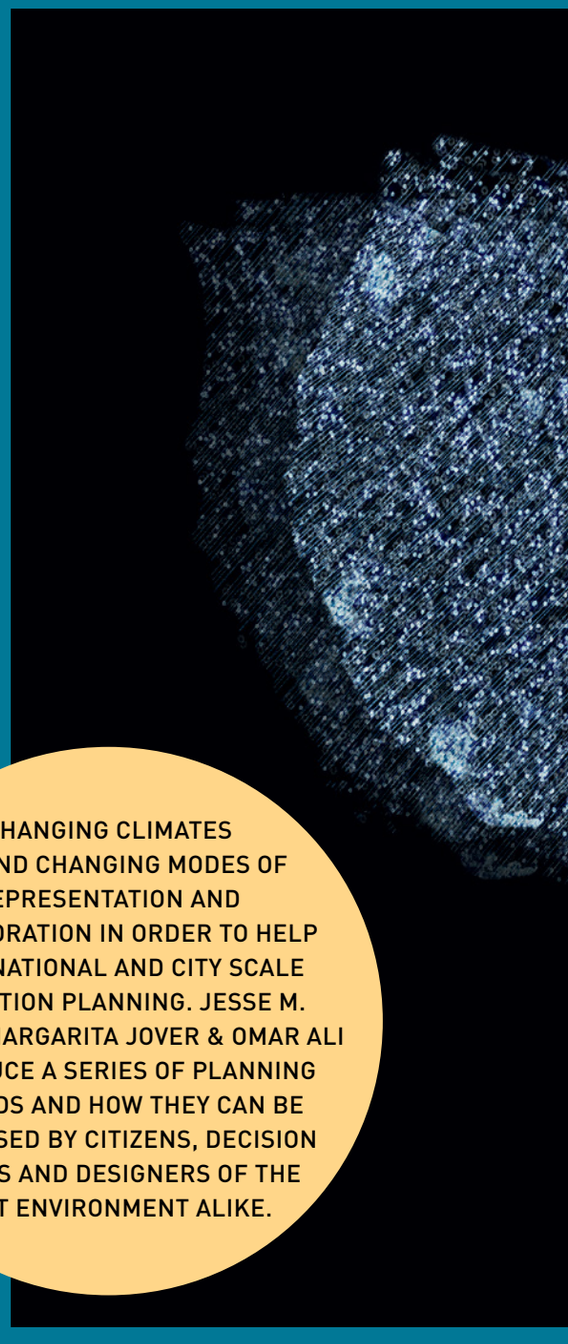

CHANGING CLIMATES DEMAND CHANGING MODES OF REPRESENTATION AND COLLABORATION IN ORDER TO HELP GUIDE NATIONAL AND CITY SCALE ADAPTATION PLANNING. JESSE M. KEENAN, MARGARITA JOVER & OMAR ALI INTRODUCE A SERIES OF PLANNING METHODS AND HOW THEY CAN BE HARNESSED BY CITIZENS, DECISION MAKERS AND DESIGNERS OF THE BUILT ENVIRONMENT ALIKE.

Photo: S. Omar Ali

As countries and cities seek more robust flows of climate-related information to inform project selection, design and implementation, a digital civic universe (DCU) offers a public domain for engagement, performance benchmarking and validation. Whether it is projecting the real-time measurement of carbon equivalent emissions of an urban landscape or providing a central platform for public commentary on the spatial distribution of resources in an adaptation plan, a DCU offers the prospect for an infinite number of applications that shape the external values of urban interventions advanced in the name of climate adaptation and mitigation. As designers and planners struggle to connect their projects with a broader strategic orientation on performance benchmarks and impacts, new forms of connection are necessary for the accountability that is required to fully realize an adaptive and sustainable urban future.

SPATIALIZING ADAPTATION PLANS

The United States is the only G20 country without a National Adaptation Plan (NAP). NAPs are plans that provide a strategic vision for how a country will coordinate climate assessments and proceed to evaluate, prioritize, develop and implement adaptation interventions. NAPs offer a valuable guide to support institutional action, but one of the inherent shortcomings is a lack of a spatial articulation regarding the alignment between human, environmental and economic geography in visualizing the flow of financial, human and environmental capital. Pursuant to the Paris Agreement, countries committed to developing their own NAPs and to helping other less developed countries along the way.[1] Investing in adaptation in developing countries – those

Mapping the future: As a Digital Civic Universe, integrated Adaptation Maps offer a systematic set of pathways for designing an adaptive and sustainable urban future.

least responsible – was and continues to be a core element of the climate justice subtext by and between the global north and south.[2] Closer to home, NAPs are also a way for countries to think critically about the efficient, effective and fair way to advance domestic adaptation priorities.

NAPs are largely shaped by the kind of cross-sector "systems" thinking that has defined practices in urban policy and environmental planning over the last decade.[3] They are heavily focused on the built environment, including a recitation of the interdependencies of various infrastructures systems.[4] Such plans internalize ecosystem services and provide a formal accounting of natural capital that is central to post-carbon economics. But, these plans are also very humanizing. The best NAPs acknowledge varying cultural values and socioeconomic trade-offs, while recognizing the strategic challenges of the distributional equity implications of who really pays and who really benefits from investments in climate change mitigation and adaptation.[5]

There are many strategic advantages for the U.S. to develop an NAP. But, perhaps one of the most controversial opportunities rests in the proposition of mapping the future of the country. In the Northern Hemisphere, ecological ranges for everything from pathogens to plants and from people to places (yes, places) are migrating north.[6] Across the country, the various geographies of risk are converging with existing stresses of inequality, affordability and accessibility to drive a shift in consumer preferences and in settlement patterns that will alter the future political and environmental landscape of America.[7] Not only does the U.S. need an NAP – its needs a National Adaptation Map (NAM). A NAM offers an accessible interface that is able to engage a range of stakeholders who might be

Drone images of Crandon Park, Key Biscayne, Florida.
Fragmented dune system ecotone, caused by rising water levels, storms and beach erosion (both images).

able to delaminate layers of information in order to inform their own decision-making. One has the opportunity to create a universe through data ontology that provides a common ground for information exchange.[8] While this may leave out plenty of valuable indicators and experiences, the positive trade-off is the allure of scalability and cooperative alignment bound by a newfound shared geography. Finding common connections through place and space is already a unique challenge in such a spatially fragmented country as the U.S.. With a DCU, there is also the participatory opportunity for individual user game playing[9] and for supporting scenario planning that evaluates multiple potential futures.[10]

An additional advantage of a NAM relates to the spatial ordering of public investments in infrastructure – outlined in a NAP – that drive the allocation of private capital in urban development, renewable energy, and managed ecosystem services.[11] Synchronizing infrastructure and settlement patterns are a major challenge, particularly as 'climigrants' are anticipated to reshape the Midwest and Northeast. Operating like a scaled-up comprehensive plan, it can spatialize cross-sector linkages and provide a mechanism for clash detection. It can also impose concurrency requirements on private sector stakeholders that force an internalization of environmental externalities through value capture mechanisms.[12] But there is also an opportunity to impose high order environmental standards for carbon equivalent foot-printing; energy balancing and renewable energy consumption; biodiversity impact; and, climate risk management standards in the design of everything from storm water management to landscapes that optimize public and environmental health.

Yet, whenever one draws a map with clearly articulated lines, there are people and places on either side of those lines. A map may not be a sufficient representational model for the complexity of networks and socioecological linkages that defy continuous and linear projections. Maps may create unnecessary division and contestation over an allocation of resources that feels arbitrary or unconcerned with spatial outliers. The design challenge is to create a map that is dynamic at multiple layers in order to internalize and visualize contextual vulnerabilities and adaptive capacities of the agent-users of the NAM itself. While real-time dynamism is not possible, the NAM may serve as a synchronization tool (between fast and slow variables) that is central to climate services.[13]

In that sense, the NAM is a mediation of dynamic states that undermines the ambition for a true (or nearly true) ontological open-access universe for climate data and information – hence its foundation as a DCU. It is worth recognizing that firms such as Google recognize the power of creating such a universe, which raises the stakes for the proposition that the NAM itself is a public good that must be subject to external validation of both user-agents and relevant scientific bodies. It is not the data in the NAM that offers the value – that is transient – it is the control of the geospatial and cultural language that yields the greatest power. Whoever writes the definitions of resilience, adaptation, climate mitigation and sustainability will yield the greatest power in the exercise of human behavior. Indeed, NAPs are powerful tools of public administration for precisely this reason. Perhaps one could argue that a NAM serves as a check on a NAP because the spatialization of policy forces a new way of seeing the functional distribution of resources that are opaquely drafted.

But, the fundamental novelty with a NAM is the opportunity to better understand the panarchic and cross-scalar relationships between regional ecologies[14] and regional governance.[15] There is a broad recognition among climate practitioners in the U.S. that the misalignment of political and environmental geography reinforces the primacy of wealth protection. Small, often less wealthy jurisdictions simply cannot keep up with the investments necessary to mitigate and adapt to climate change. As such, new forms of governance and self-organization that more closely align natural and financial capital are required to achieve the necessary depth of a net-zero transition. New forms of self-organization made visible by NAMs may also play out among a constituency of local stakeholders who want to cooperatively invest in their communities through pooled expenditure in everything from sustainable infrastructure to affordable housing. If one can break the scalar bondage of globalization in energy and mortgage markets, then one may reorganize outside efficiency traps of fossil fuels embedded in the energy and materials of the built environment.

THE DIGITAL CIVIC UNIVERSE FOR CITY DESIGN

City adaptation maps (CAM) offer the promise of a localized DCU that builds constituencies

Photos: Key Biscayne Community Foundation

and organizes a vision for the future of the city. A CAM cannot simply be a comprehensive plan under a new name that is otherwise bounded by the limited constitutional authority of regional planning. Like a NAM, a CAM should be conceptualized as a DCU platform with varying levels of validation and self-regulation by and between community editors and scientific consensus bodies. Think wiki-map meets climate.gov. It is rolling stocktake of natural capital and human lives lost by the day and a projective tool for simulated futures at the same time. It allows users to test their assumptions, inform their opinions and realize their preferences.[16] This is not a means to substitute lay judgement through simulation for that of the professional judgment of a designer, rather it is a means to touch, explain, learn, validate and hold accountable. It is both empirical and normative in its interface design. Visual techniques for opacity and delamination allow for statistical confidence intervals of climate modeling to live alongside the qualitative experiences of local stakeholders.[17] The interaction may be casual, inferential or non-existent, but it provides a basis for transparency, learning and accountability. A CAM is the DCU that the Smart Cities Movement failed to deliver because those proponents envisioned an objective universe entirely formulated by the quantifications of measurement science and not the qualifications of user experience in a diverse range of subjective realities.[18] Given the limited resources and fragile condition of many cities, they are going to have to take steps to determine where to invest and where to disinvest. In other places in the U.S., adaptation has meant aligning land use patterns with infrastructure capital planning to create defensible urban service corridors in high-risk geographies. From climate gentrification to the loss of culturally valuable places, the costs of such a transformation are immense and immeasurable.[19] They certainly defy an immediate economic calculus. But, the status quo also has its costs – and those costs are extreme. For this reason, the language of 'managed relocation' and 'managed retreat' has become part of the popular lexicon.[20] Many investors are already eyeing land in post-retreat receiving zones and these investment patterns suggest an ad hoc development pattern of suburban sprawl not seen in a generation.[21] A CAM could help bring some order to an alignment of infrastructure and housing investment necessary to transition the population living in the highest risks areas. By developing a CAM, a city can set an agenda for where it wants to prioritize the development of critical infrastructure and low and mixed-income housing development. But, a CAM is not a masterplan. Rather it is a dynamic representation of a fluid set of conditions that challenge the building of new constituencies among stakeholders in a way that allows for a new aggregation of capital that manifest in new forms of urban development. In the same way that a NAM opens the door for regional convergence of ecology and governance, a CAM may be able to offer insight into new forms of development districts and organizations that hybridize public, private and civic self-organization. The State of Wyoming recently recognized decentralized autonomous organizations (DAOs) composed of participatory capital holders (i.e., cryptocurrency and blockchain contract holders) as legal entities that break the mold of place-based power. One DAO is in the process of building a new city from scratch in Wyoming that will be entirely paid for and governed by a DAO.[22] In theory a series of decentralized non-human bots could utilize artificial intelligence to form a DAO and build a city of data-centers and energy generation facilities that do nothing more than create the energy to sustain its very non-human existence. A city can go in the entirely opposite direction and create centralized human-only autonomous organizations that are explicitly place based as a means of keeping capital in place through tax-efficient dividends and non-monetary value exchanges that account for advances in social and environmental capital. The opportunities for innovation are endless – and the true currency is the flow of information through a DCU of a CAM and its associated physical and political processes. As new forms of self-organization emerge through the common linkages of a CAM and its DCU, the challenge will be to create district-scale urban development that reflects the scalability of intermediate cooperative organizations. Could local social organizations create their own urban districts whose profitability is internalized to the advancement of its community members and that of the city? Could crowd-sourced housing complexes emerge with their own architecture and urban spaces that reflect the values of its membership and the historic context of the city? Cross-scale interactions among self-organized community developers offer the opportunity for design innovation and a commitment to sustainable urban development. Here, sustainability is inclusive in terms of both environmental and social sustainability.

FUTURING AS A TOOL FOR DESIGNING

As a Digital Civic Universe, integrated City Adaptation Maps and National Adaptation Maps offer a systematic set of pathways for futuring. But, futuring is not the same thing as designing. It is merely an analytical adjunct to the processes of design. In this context, design and urban development projects can be nested within a physical landscape that is textured and calibrated by a digital landscape. Maps and a dynamic DCU created by a CAM or a NAM offer the opportunity for an alternative path forward. New ways of seeing, living, investing and socializing need new tools for the exchange of science and experience.[23] Connecting national and regional scales through a NAM with the local and district scales of a CAM may offer greater awareness and sensitivity to the normative processes of defining one's climate future.

Designing a climate future is fraught with the dangers of conceptualizing tomorrow based on the unsustainable values of today. New models of information exchange offer an acceleration of the flow of information for the adaptation of cultural and economic values. Will these domains devolve into misinformation conduits that define toxic social media firms like Facebook? Maybe. Maybe not. But here, we begin from the basis that our DCU with CAMs and NAMs is a self-regulated public resource domain. That is the easy part. The hard part is coming to terms with the proposition that our climate future is limited only by our collective imagination for what is possible.

FOOTNOTES

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