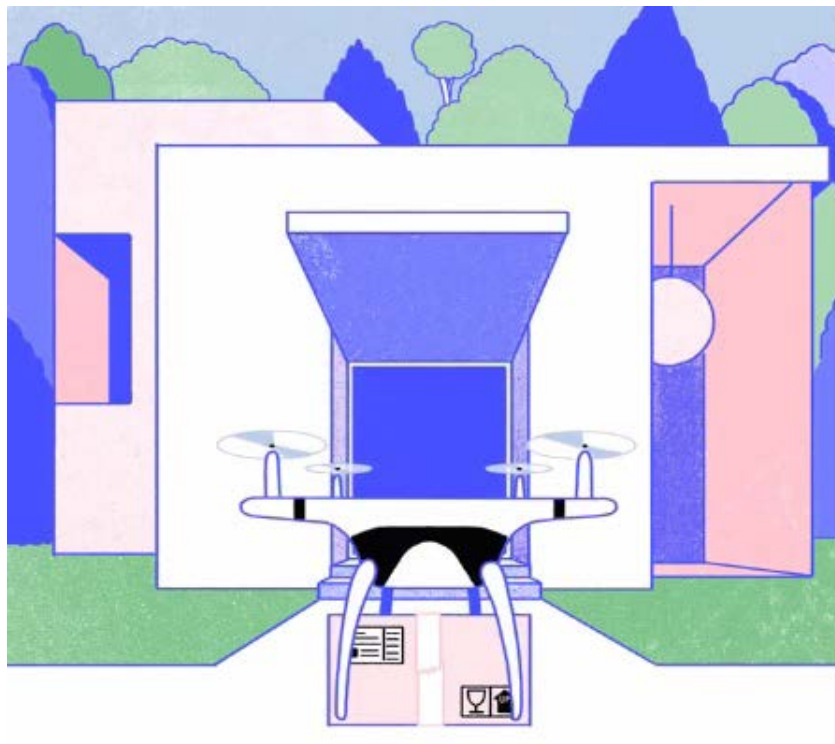


Norman B. Leventhal Center for Advanced Urbanism

Highlights

In October 2017, the [Norman B. Leventhal Center for Advanced Urbanism \(LCAU\)](#) released *Infinite Suburbia* (Princeton Architectural Press), the culmination of a two-year collaboration with a network of artists, researchers, theorists, faculty, and students, which examined emergent trends in suburban design and development around the world. The book presents 52 essays by 74 authors from 20 different fields. The center hosted a book launch in November with Harvard University's Joint Center for Housing Studies and was followed by a domestic and international lecture series. *Infinite Suburbia* sold out in four days and is now in its third printing. It has generated a healthy debate on the topic, attracting attention through book reviews and wide coverage in the popular press, including feature pieces in the *New York Times* ("The Suburb of the Future, Almost Here") and *The Economist*.



Drones at your doorstep, from "The Suburb of the Future, Almost Here" by Alan M. Berger. (Credit: Jun Chen, New York Times)

In May 2017, the Housing+ biennial culminated with an exhibition and conference that explored global housing affordability through the lens of multi-scalar design. During the past two years, the center collaborated with more than a dozen local partners, including universities, nongovernmental organizations (NGOs), foundations, and public housing agencies, and more than 50 students from the School of Architecture and Planning participated in six international housing workshops. Over a dozen faculty members engaged with this theme, which was spearheaded by Professor Adèle Santos, and proposed design solutions from built work and masterplans to new housing and neighborhood typologies. Following the Housing+ conference, LCAU examined local

affordability challenges in Boston, co-hosting the half-day Rebuilding the Supply of Affordable Housing symposium with Fannie Mae. Chrystal Kornegay, executive director of MassHousing and Department of Urban Studies and Planning alum, kicked off the event by framing supply-side challenges in Massachusetts, while other Architecture and Planning faculty and alumni presented new innovations in manufacturing and construction as well as new models for cohabitation.

During the past academic year, LCAU helped support more than 20 graduate students in the Department of Architecture and Urban Studies and Planning through research and workshop funding. Additionally, two undergraduates joined LCAU through the Undergraduate Research Opportunities Program (UROP). LCAU has welcomed visiting students, faculty, and scholars from China (Chongqing University and the Beijing University of Civil Engineering and Architecture) and Ukraine (a Fulbright Scholar from the NGO Urban Curators). In the coming academic year, we will host visitors from China (Southeast University), Canada (Queen's University), Switzerland (École Polytechnique Fédérale de Lausanne), and Australia (University of Melbourne).

This year's joint urban design studio, *Cities by the Sea*, explored resiliency districts as a design framework for adapting coastal urban morphologies to meet the challenges of sea level rise in Boston. Designing for resiliency at the district scale within this studio highlighted new methods for identifying and protecting critical infrastructures, planning opportunities for urban growth that hybridize new infrastructure to combine transportation and flood protection, and new tax incentives for developers that better reflect landscape risks.

Professor and former dean of the School of Architecture and Planning Adèle Santos and research scientist Debora Mesa received a 2017 Lafarge Holcim Award for their project focusing on affordable housing in Cartagena, Colombia. The regional jury cited the project's "richness of interpretation and...level of detail ripe for implementation." At MIT, Santos and Mesa co-taught an architectural design workshop, *A New Neighborhood: Cartagena, Colombia*, in which students from the Department of Architecture developed design proposals for an affordable housing neighborhood with integrated workspaces. This workshop was part of a broader research collaboration with Fundación Mario Santo Domingo (FMSD) that examined urban resilience for low-income housing. The work was included within the Housing+ exhibition as part of the center's biennial theme on affordable housing.

In spring 2018, the center released *Design Guidelines for Urban Stormwater Wetlands*, the culmination of a two-year collaboration between Professors Heidi Nepf and Alan M. Berger funded by a grant from the Abdul Latif Jameel World Water and Food Security Lab. Ultimately, the design guidelines aim to "inform decision makers, planning agencies, consulting engineers, landscape architects, and urban designers about the efficacy of using ecologically designed constructed wetlands and ponds to manage stormwater while creating new public realms." The guidelines, which were disseminated to more than 120 public officials, chief resiliency officers, and urban practitioners, give practitioners and designers a new set of adaptable forms to work with and elaborate upon, either in implementation or in future research. This work represents a crucial first step in exploring forms and validating designs quickly and easily with scientifically rigorous metrics.



Illustration from *Design Guidelines for Urban Stormwater Wetlands*. (Credit: Jonah Susskind)

In the coming academic year, the center will launch its new triennial on equitable resilience, leveraging the current global momentum to plan and design around the idea of more equitable resilience for cities. Faculty from throughout the School of Architecture and Planning have shown interest in engaging on the topic and, to date, have proposed themes that touch on design, vulnerability, infrastructure, technology, and policy. Public programming will begin in the fall with *Adaptation Blueprint: Designing a New Policy Agenda for the Coast*, a daylong symposium that the center will co-host with the Wharton Risk Management and Decision Processes Center at the University of Pennsylvania.

Annual Review

During the past academic year, LCAU worked with two new members, initiated seven sponsored research projects, and concluded its biennial theme on affordable housing.

Projects

Cataloging the Interface: Wildfire and Urban Development in California

The rapid proliferation of rural development in the United States has, in the past several decades, led to the steady growth of areas known as the wildland-urban interface (WUI). Defined as a developed area that meets or intermingles with undeveloped wildlands, the WUI is associated with an increased risk of wildfires. In California, where at least 25% of the state's population (more than 11 million people) lives in the wildland-urban interface, wildfires have become enormously destructive. The issue is compounded by decades of poor forest management, a statewide housing crisis, and a limited budget for management of federal lands. Studies that incorporate climate change models show these fires continuing to increase dramatically in both severity and frequency due to longer, hotter dry seasons and more abundant fuel reserves. This project is researching settlement patterns within and adjacent to California's WUI areas. The project will culminate in a comprehensive survey of physiographic conditions and development trends that pose challenges and provide opportunities for urban designers, policymakers, and landowners in these high-risk areas. The project's principal investigators (PIs) are Alan Berger and Jonah Susskind.

Intelligent Water-Energy Micro Nexus

Developing predictive and integrated water-energy grid management schemes is critical in providing reliable and cost-efficient electricity and water for arid regions. Matching supply to demand will become increasingly difficult in the future as climate change drives extreme weather patterns, additional sources of irregular demand are incorporated (electric vehicles), and society transitions to sustainable but intermittent energy sources. In arid farming communities around the Arabian Gulf, disruptions to either electricity or water supply would cause rapid destruction of crops during the summer months and pose serious health risks to the population. While supply-side management has been the subject of industry-led optimization for many decades, its limits are being reached. New forms of management are needed. This project focuses on understanding the potential of demand-side management of water resources as a means to improve rural and urban micro-grid reliability and cost. Project PIs are Konstantin Turitsyn and James Wescoat.

Shrinking Cities in the United States and China: A Transnational Comparison

Since the 1970s, once-prosperous American heavy industrial areas have been mired in economic recession and deindustrialization, triggering large-scale depopulation in what is colloquially called the Rust Belt. Many scholars have examined planning, policy, and design responses to this depopulation in Rust Belt cities. Beginning in the early 2000s, German scholars coined the term “shrinking cities” to draw attention to the mismatch between these cities’ shrinking populations and their remaining, often half-abandoned built environment. Such urban shrinkage was once deemed a phenomenon that occurred only in the developed world, and few would ever expect it to occur in China, a fast-growing nation. However, due to China’s family planning policies and changing fertility rates, as well as economic transitions, many shrinking cities are emerging in the northeastern part of the country, once China’s most industrialized region. This project will support a collaboration in which MIT and Tsinghua University will conduct a transnational comparison study of shrinking cities in northeast China and their counterparts in the US Rust Belt. The project PI is Brent Ryan.

Augmenting Human Interaction Through Lighting in Shared and Public Spaces

This research effort seeks to understand and augment human interaction through lighting in shared and public spaces. For almost a century, light has been the primary interface for information transmission and communication; yet, input/output devices have largely remained limited to private and single-user scenarios, failing to engender novel social and collective human experiences. By focusing on the use of shared and public lighting, this project seeks to develop new technologies and interfaces that operate at architectural and city scales (e.g., bridges, building façades, stadiums) and that will advance how we experience and use light as a tool for creativity, communication, learning, collaboration, and emergency response. The PI is Marcelo Coelho.

Development of Urban Worker Personas

This research is developing a library of urban workplace personas that offer new insight into the working habits and lighting control needs of today’s knowledge workers. This insight can be used to design more advanced personal lighting controls, including interconnected controls that enhance the visibility of electronic surfaces in the

workplace. On a larger scale, such insights could better characterize resident behavior in urban-scale environmental performance analyses to support the design of urban innovation hubs. The PI is Christoph Reinhart.

Visiting Artist Collaboration

The center received funding to continue the successful collaboration with New York–based visiting artists Matthew Niederhauser and John Fitzgerald for the Housing+ exhibition.

Rural Water Supply and Sanitation Planning in Maharashtra

This work, funded by the MIT Tata Center for Technology and Design, is part of a World Bank–supported project with the government of Maharashtra (India) to strengthen the state’s district water supply planning. The PI is James Wescoat.

Members

Two new members joined LCAU during the past academic year: Fannie Mae and the Moreton Bay Regional Council (MBRC). The center welcomed MBRC as a new corporate member following an introduction as part of the *Infinite Suburbia* book lecture series. MBRC has set out a vision for the largely suburban Moreton Bay region north of Brisbane, Australia, to achieve 70% self-containment. As part of this commitment, the council recognized that as economic, social, and technological systems evolve, the conventional monocentric urban model needs to be reimaged to incorporate broader geographies that increase housing affordability, reduce congestion, maximize resource efficiency, and enhance livability. LCAU will begin collaborating with MBRC to develop a regional transportation model allowing analysis of transportation flows and enabling the center to engage in the policy side of regional self-containment. An MBRC delegation will visit Cambridge in fall 2018 for a two-day workshop, with a dozen affiliated faculty joining the conversation to highlight research in the areas of smart cities, transportation, and energy.

Prompted by the 50th anniversary of the Fair Housing Act, Fannie Mae reached out to LCAU to help convene a conversation around affordable housing, minority home ownership, and innovations within financial technology. The group’s general vision was to co-host an event with LCAU as part of its knowledge summit series. LCAU engaged with Fannie Mae through an associate membership, and, following the successful Rebuilding the Supply of Affordable Housing symposium, the center plans to explore further joint opportunities during the fall.

Signify (formerly Philips Lighting) continued the third year of its research collaboration with MIT, funding seven sponsored research projects, two of which were extensions from the second year. Among these seven projects, two supported faculty within the School for Architecture and Planning, namely Christoph Reinhart and Marcelo Coelho. Their work explored different aspects of the interrelationships among lighting, built form, and people’s experiences of space (both internal working environments and external public spaces). Signify continues with an affiliate-level membership with LCAU.

During the summer, LCAU will be concluding its efforts with Fundación Mario Santo Domingo after three years of membership, one as a corporate member and two at the affiliate level. After the research and design project resulting from the collaboration with

FMSD won a Lafarge Holcim Award, the design proposition was showcased at the Housing+ exhibition in spring 2018. In addition to the Cartagena workshop led by Adèle Santos and Debora Mesa, this relationship supported sponsored research with Professor Larry Vale on urban resilience in Colombia, that wrapped up with a final report in the spring.

Biennial Theme

The provision of housing is a global challenge with an urgent need for innovation. Attempts at comprehensive, scalable housing solutions have been ongoing by governments, private enterprises, and NGOs alike. Even though there are examples of progress made in the fields of social science, policy, and humanities, this area continues to be a concern. Only recently has formal design been used as a lever for tackling housing affordability, whether at the scale of the house, neighborhood, or city. There is a dearth of affordable housing designs that are inspiring, sustainable, inclusive, or substantial enough to satisfy the full spectrum of human rights and aspirations at a meaningful level. In its third biennial theme, Housing+, LCAU explored this global phenomenon through the lens of multi-scalar design.

As outlined by Adèle Santos, the Housing+ themes were as follows:

- Housing is essential for a functional life.
- Housing can be the foundation for a social community.
- Housing can stimulate community building.
- Housing extends beyond the private realm.
- Housing can be an essential part of infrastructure.
- Housing needs support of services and institutions.
- Housing is an important factor in community health.
- Housing ownership is an entry to the economy.
- Housing is the largest fabric of urbanity.

The Housing+ exhibition was the culmination of two years of design and research inquiry involving faculty, students, and practitioners from around the globe. It included nine new architecture and urban design models resulting from faculty-led workshops in Brazil, Colombia, Guyana, India, Peru, and Rwanda. Each workshop collaborated with communities and organizations to test multi-scalar solutions and prototypical models that tackle issues related to affordable housing. Accompanying interviews outlined the challenges faced by the teams in their local contexts and were complemented with aerial footage and maps showing the global conditions of affordable housing settlements.

The Housing+ conference extended the design dialogue beyond the scale of the housing unit. Panels investigated how housing interacts with aspects of urbanity such as public space and infrastructure. Speakers addressed the challenges that designers face in the housing sector, including those related to affordability, resilience, health, and sustainability.



Housing+ on display in the Media Lab's Okawa Lobby Wang Shu, dean of the School of Architecture at the China Academy of Art, delivers the Charles Correa (1955) Lecture on Housing and Urbanization, which explored the "publicness" of housing in China. (Credit: Justin Knight)

Workshops

A Live-Work Neighborhood for Low-Income Households

Government-sponsored affordable housing projects in Colombia are typically built as groups of houses without the necessary social infrastructure. Often located far from employment opportunities and lacking transportation networks, these projects are not satisfactory living environments. To address these gaps and to create typologies of affordable housing that are sustainable and reflective of local needs, this workshop used Cartagena as an example to develop new housing prototypes that incorporate living and working.

The workshop investigated a livelihood-based approach to the idea of "home" — where the neighborhood supports both living and working — for a superblock in Ciudad Bicentenario, a new affordable housing community being built in Cartagena. The MIT team worked with Fundación Mario Santo Domingo, known in Colombia for building "habitats," including infrastructures such as schools, child-care centers, health services, and recreation facilities. Employing their model focusing on community and social infrastructure to create livable spaces, the team proposed solutions for live-work typologies at the block, neighborhood, and house scales. MIT students engaged with local stakeholders, FMSD, and local university students to develop a master plan, public realm strategies, and housing typologies. The workshop's leaders were Adèle Santos and Debora Mesa.



A neighborhood workspace and inner clustered courtyard. (Credit: Justin Lim)

Neighborhood Upgrading for Productive Public Space and Housing Improvement

Informal settlements occupy some of the most vulnerable locations in urban regions, along infrastructural corridors and in hazardous geographies such as low-lying plains. Many such settlements are built with temporary, scavenged materials and have limited access to urban services. However, while being home to the most vulnerable populations in the city, these communities often have active social networks and bottom-up organizations. In such a context, how can designers learn from these strengths to design built environments that provide for autonomous living, low-cost housing, and risk management? Held in Georgetown, the capital of Guyana, this workshop tackled these challenges at the neighborhood scale to offer housing that strengthens communities while providing safe, hygienic, and resilient shelter.

The workshop explored aspects of public infrastructure, flooding, and community development as they relate to housing in the neighborhood of Sophia, located approximately three miles east of downtown Georgetown. The redevelopment of the major north-south canals and their flanking reserves is the focus for building a strong community open space and amenity infrastructure. Since these reserves represent the divisions between neighborhoods, this approach creates mutual areas of emphasis. The linear development contains a community marketplace and spaces for intensive agricultural production that could serve markets within and beyond Sophia. The proposed new twin houses involve inherent cost savings, and these structures are clustered to reduce costs further. This housing arrangement also allows for greater public space and new community typologies. Workshop leaders were Adèle Santos and Marie Law Adams, with collaboration from the Central Housing and Planning Authority of Guyana, the Inter-American Development Bank, the MIT International Science and Technology Initiatives Global Seed Funds, and the University of Guyana.



Proposed cluster formation for a new twin housing system in Sophia, Guyana. The system will leverage existing infrastructure to develop public space and agricultural production. (Credit: Giovanni Belotti)

High-Altitude Urbanism in the Lurin Valley of Peru

This three-week workshop held in collaboration with La Victoria Lab explored emergent cross-altitude urbanism along a 70-kilometer transect of the Rio Lurin valley from Lima to the Andes. It combined an understanding of existing physical and digital infrastructures on the geological scale of the Rio Lurin with specific material responses. Less like technology solutions and more like “hacks,” the proposed designs amplified what people are already doing. This workshop proposed scalable and adaptable designs

that, while disruptive and even compromised or imperfect with respect to mainstream top-down practices and policies, open up a conversation on possible new futures. The workshop leader was Sheila Kennedy.

Inner City Affordable Housing Models

The commitment of the Brazilian government to building affordable housing through the “Mi Casa Mi Vida” initiative in São Paulo has been widely criticized for several reasons. The failures of these projects on urban peripheries have been well documented, including limited access to the services and employment opportunities that are critical to inhabitants. The program continues despite being considered an expensive failure. This workshop addressed these concerns by developing models for affordable inner-city housing in São Paulo. While proximity to the city addresses many of the problems associated with the project, it presents its own set of challenges—expensive land; preexisting cultures, built forms, and economic activity; and a complex web of zoning, land use, and financial issues—all of which were tackled during the workshop.

Deriving from the Brazilian housing program Casa Paulista, the workshop explored ways in which affordable housing can realistically be incorporated into the existing urban fabric and corresponding socioeconomic and legal frameworks. Students examined planning and urban design solutions for accommodating approximately 3,700 housing units in the Brás sector, designated as a Casa Paulista program site. Working with existing zoning and financing mechanisms, they explored the potential application of new typologies for affordable housing at the scales of the neighborhood and the block. Workshop leaders were Adèle Santos and Angelo Bucci, with collaboration from the University of São Paulo, MIT-Brazil, and the MIT School of Humanities, Arts, and Social Sciences.

Disaster Resilient Housing in Rurban Saurashtra: Chitravad Village

“Rurbanism” seeks to provide urban amenities in rural villages and to thereby improve quality of life, mitigate hazards, and reduce migration to stressed metropolitan agglomerations. To test the concept of rurbanism, this MIT workshop collaborated with the Aga Khan Agency for Habitat in India on a project involving the village of Chitravad on the Saurashtra Peninsula of Gujarat. The workshop incorporated on-site fieldwork, interviews, and design charrettes at the house, street, and village scales. Students elaborated Chitravad’s visions and linked them with opportunities provided by national housing policies. Rurban Chitravad is envisioned as an educational, horticultural, and eco-tourism hub that will build upon its proximity to the Gir Forest. The village plan has four major components, as follows.

- **Loop Road:** A proposed road infrastructure would reduce risk by protecting vulnerable populations from floods during monsoons, improving access, and establishing points for water and waste collection, thus enhancing sanitation, public health, and aesthetics.
- **Housing+:** A rurban housing improvement strategy will house the poorest inhabitants living in risk areas, rehabilitate and make safer abandoned or unsafe properties in the central village, and improve public spaces.

- Mari Shehri (My Street): A progression of street improvements will strengthen major evacuation routes, enhance civic beauty, and provide public safe havens for all castes and religions.
- Rurban Amenities: The Loop Road will be complemented with new housing, a bus stop, a market, a fabrication lab, and a playground, linked together by the shade of the loop's new tree canopy.

The workshop's leaders were James L. Wescoat Jr., Lorena Bello Gomez, Marie Law Adams, and Brent D. Ryan. Collaborators were the Aga Khan Agency for Habitat, the MIT Aga Khan Program for Islamic Architecture, and MIT-India.

A New Affordable Village House for Rural Lands

Worldwide, as urban regions and populations grow, rural areas often get left behind, struggling to improve housing conditions, preserve local community, and maintain agricultural environments. In such a context, how can urban planners, designers, and architects improve village life through design? Can they promote village development plans and rural housing models that straddle modernity and technological advancement while being rooted in vernacular typologies, culture, and geography? Working within this context in Kigali, Rwanda, this workshop explored new village house prototypes that build upon current building practices, local crafts, and community needs to optimize climatic and spatial performance.

During the workshop, students collaborated with local communities and experts, such as engineers and masons, to understand vernacular design and construction mechanisms for local residences. Cultural values of local communities drove housing typology solutions. Proposals included the development of new house typologies that emphasized the modularity of units, employed brick walls to allow natural ventilation, reduced the use of mortar, displayed flexible interior layouts and room divisions of industrialized weed panels, and included semi-enclosed outdoor spaces as an extension of interior spaces.

Since the end of the workshop, which saw the partial construction of a prototype, a house has been completed and is now occupied by a family from the village. Engagement with domestic partners is ongoing, and the scope of the workshop has been expanded to include a village master plan on which work continues. The workshop leader was Rafi Segal, with collaboration from MIT-Africa, the MIT Tata Center for Technology and Design, the Rwanda Housing Authority, Skat Consulting Ltd., and Strawtec Building Solutions.



Constructed housing prototype in Kigali, Rwanda. (Credit: Ben Segal)

Leventhal Graduate Fellowships

The AY2019 Leventhal Graduate Fellowships in the Department of Architecture and the Department of Urban Studies and Planning have been awarded to Malcolm Rio and Bella Purdy, respectively. They will each receive a partial fellowship to supplement their tuition and stipend, and they will work with James Wescoat and Alan Berger on the LCAU triennial theme.

Bella Purdy is a master of city planning candidate in the Department of Urban Studies and Planning, where she is associated with the City Design and Development and Housing, Community, and Economic Development program groups. Her research and curriculum are focused on climate resilience and adaptation planning, with an emphasis on developing permanent post-disaster housing solutions and open space strategies that mitigate flood risks and heat island effects. Before coming to MIT, Purdy worked in Philadelphia as a design professional at the architecture and research firm Kieran Timberlake, where she contributed to the design, detailing, and prototyping of façade and envelope systems for new student housing in Seattle and San Francisco. She was also a Priscilla King Gray Public Service Fellow in the Boston Department of Environment, Energy, and Open Space. Purdy will continue her research and training in sustainable and resilient urban development as an LCAU Leventhal Fellow.

Malcom Rio is a graphic and architectural designer and thinker from Amherst, MA. Before coming to MIT, Rio was an inaugural AICAD (Association of Independent Colleges of Art & Design) Teaching Fellow at the Maryland Institute College of Art (MICA) in Baltimore, where he taught graphic design, architectural design, and foundation studio courses. During his appointment at MICA, Rio's research focused on the racial and class dimensions of mobile network technologies in Baltimore as a case study of the hollowing out of public transit systems in medium-sized, post-industrial US cities. His current research at MIT investigates the interrelationships among architecture, urban planning, and utopian narratives in producing forms of subaltern or "blackened" citizenship. Rio earned an MArch from the Rhode Island School of Design and a BS in philosophy and fine art in graphic design from Towson University.

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