INTERVIEWS WITH EXPERTS

The editors interviewed members of the scientific committee to present the views of practitioners, researchers, and educators on the idea of regenerative cities and the associated challenges. The scientific committee consisted of multidisciplinary professionals ranging from engineers, architects, and urban planners to researchers, academic experts, and artists representing universities across the United States and worldwide.

Illinois Institute of Technology

University of Illinois Chicago

University of Cincinnati

Purdue University Regional Development Center

Virginia Tech

Abu Dhabi University

KHEIR AL–KODMANY

Interview conducted by Piyush Khairnar, February 2023.

[PK] As a researcher, what do you think are the challenges faced by contemporary cities today that need immediate attention?

[KA] Cities face various challenges, including climate change, pandemics, overcrowding, traffic congestion, social inequality, environmental threats, air pollution, increased poverty, shrinking resources, etc. However, the main challenge that exacerbates all the above problems is the increasing urban population. According to the UN, 70 percent of the world's population will reside in urban areas by the year 2050, up from the current estimate of 55 percent. For a greater understanding of this increased magnitude, it can be represented as 70 million individuals yearly, or nearly 200,000 people per day, for the next several decades. Indeed, the effects of environmental hazards are compounded by rapid urbanization, which puts pressure on basic infrastructure, and by more frequent and extreme weather events, both of which may be traced back to global climate change. Flooding, tropical cyclones (to which coastal towns are especially prone), extreme heat, and diseases are all common environmental risks. Cities are particularly vulnerable to such dangers because of their high population densities and compact layouts. One of the municipal authorities' most significant issues is figuring out how to make cities more robust against these environmental hazards. High-density, high-rise cities suffer from distinct social, economic, and ecological problems. Similarly, sprawling leads to severe ills. Urban sprawl limits the amount of land that may be used for agriculture and water catchment, and it raises energy consumption. As such, housing the urban populace will be complicated, dilemmatic, and potentially counterintuitive.

[PK] At a macro scale of design interventions, how can we leverage urban design as a tool to mitigate the effects of social inequities and climate crises in cities?

[KA] The guideline is straightforward. Urban design efficacy is inextricably linked to the geographical scale of the project at hand. When considering a larger spatial scale, urban planning policies become more critical. Studies and research on urban planning should address social disparities and climatic crises on a macro or regional scale. Once the scale is reduced to something more manageable, such as a neighborhood or community, urban design comes into play.

[PK] Regenerative design is an emerging concept that looks beyond sustainable design. How can regenerative design principles be integrated into the planning and development of cities to promote better urban life?

[KA] Aspirational in nature, "Regenerative Urbanism" calls for a rethinking of traditional approaches to urban design and planning in favor of more dynamic, elastic, and multifaceted modern models. It highlights a process that synchronizes and synthesizes information flows via simulation and forecasting of multiplex forces within an ever-developing intelligence network. It also serves as a catalyst for a holistic, evolutionary approach to urban development, which in this case is focused on risk management and resilience in the face of natural disasters.

[PK] What examples of regenerative urban projects have been implemented successfully in the field of architecture/ urban design/planning, that emerging researchers and practitioners should study and why?

[KA] One current project that exemplifies Regenerative Urbanism in Chicago is the Illinois Medical District (IMD) redevelopment. The IMD is conveniently positioned to the west of the Chicago Loop, containing over 40 different healthcare-related establishments spread across the 560 acres that comprise this special-use zoning district. Recently, the IMD Commission (IMDC) wanted to "regenerate" the IMD into a mixed-use district, consisting of a mixture of life science, residential, retail, hotel, and patient service buildings. The IMDC desires to increase multimodal forms of transportation, as well as new parks and better streetscapes, while improving the parking and using vacant land towards the south of the IMD to build research facilities and labs. The IMD's vision is to become a neighborhood with many amenities for residents by adding parks and green space, having events like 5k runs, supporting public art, leisure or "play" destinations, bars and restaurants, museums, and shops. Adding pedestrian-friendly street design elements and ground-floor commercial businesses are ways that IMD can become more residentially desirable.

[PK] Community engagement is a crucial aspect in urban development. How can urban designers and planners collaborate with local communities and stakeholders to promote regenerative practices in cities?

[KA] The term "community engagement" refers to the act of addressing problems that affect the well-being of a specific group of people by coordinating the efforts of individuals who are connected either by proximity, same interests, or shared experiences. It's a potent tool for influencing policy and changing individual habits to improve quality of life. Partnerships and coalitions are frequently used to assist in mobilizing resources and influencing systems, altering the dynamics of existing partner relationships, and functioning as catalysts for sweeping shifts in policy, practice, and program design.

Finding a group willing to work together on urban design is costly and time-consuming. Collaboration requires careful preparation, budget, time, and patience regardless of the adopted theoretical frameworks (New Urbanism, Regenerative Urbanism, Vernacular Urbanism, Incremental Urbanism, Instant Urbanism, Tactical Urbanism, or Landscape Urbanism). Before any meaningful planning can begin, it takes great effort and energy to reach a consensus on shared goals, objectives, values, priorities, pillars, elements, and vision. Using IMD as an illustration, a common worry is that different parties are working on their masterplans without sufficiently communicating. To find a solution, IMDC encourages a roundtable discussion with all parties concerned.

New apps and visualization tools could be helpful in promoting public participation. According to our research findings, the apps help engage many participants, allow real-time communication, and make it easier for stakeholder managers to communicate productively with local inhabitants. However, a significant portion of their success is tied to how well the system can accommodate individual needs. Significantly, having a successful method for generating consensus during the planning phase positively impacts the management of stakeholders as well as the performance of the applications during the execution phase.

Dr. Kheir Al-Kodmany is a Professor of Spatial Planning and Urban Design at the University of Illinois at Chicago (UIC). His research and teaching cover a wide spectrum of topics, including vertical urbanism, sustainable design, Geographic Information Systems, visualization systems, public participation, and crowd management.

He has published 7 major influential books and over 100 papers. Dr. Al-Kodmany taught for 25 years at UIC and 5 years at UIUC. He secured substantial grants and authored visualization software. Before joining the UIC faculty, Prof. Al-Kodmany worked for the Chicago firm Skidmore, Owings & Merrill (SOM).

KENNETH CHRISTENSEN

Interview conducted by Alejandro Saldaña Perales, February 2023.

[ASP] What, in your view, are the challenges and opportunities of interdisciplinary research, especially in the post-pandemic era?

[KC] I think that interdisciplinary research is even more relevant and needed in the post-pandemic era. One of the lessons the pandemic taught us is the need to bridge disciplinary gaps to have impact: from standing up mobile hospitals to the development of vaccines that not only had to be developed and tested in labs but also manufactured and distributed in mass quantities. The challenges facing humanity today and in the future are inherently interdisciplinary and demand interdisciplinary solutions that are equitable and sustainable. We have excellent examples of this type of interdisciplinary approach to discovery and impact through research on our campus, and the more we can promote this approach, the greater the impact we will have and the better trained our students will be to operate effectively in a global and interdisciplinary society.

[ASP] How do academic and professional collaborations foster research and innovation within the student communities?

[KC] One of the most important impacts that an interdisciplinary collaboration to research and innovation can have is the training of students to operate with this mindset. The issues they will tackle in their future careers will require collaboration and will involve people interacting and working together across the domains of their disciplinary expertise. By being involved in driving collaborative research and innovation that tackles the grand challenges of today and tomorrow, students are receiving front-line training on its value and impact. We should encourage our students to help drive this change towards an inherently interdisciplinary approach by seeking out peer collaborations across disciplinary boundaries and helping faculty and staff see the opportunities available by being more collaborative and intentional in bringing diverse perspectives and solutions to the table through collaboration.

[ASP] What is the current state of research and development in an academic setting? From your perspective, what key lessons should aspiring scholars address in the future?

[KC] Academia has always lagged behind society in terms of evolution and change. The grand challenges of the last 20 years and those ahead of us have all been interdisciplinary in nature, but we are just now seeing the onset of a culture of research and innovation at academic institutions that align with these needs. The degree programs we offer, especially those at the graduate level that might launch students along a research path, are still too disciplinary in nature as well. Aspiring scholars should seek our education and research opportunities that allow them to cultivate skills to operate at and across disciplinary boundaries to have maximum potential impact. They should also seek out mentors who reflect this philosophy in their activities in order to learn and deploy best practices. Finally, taking advantage of external training opportunities (internships, for example) during their studies that also cultivate these important skillsets will ensure aspiring scholars are armed with the necessary tools to innovate in service to humanity in their future activities.

[ASP] What are the current and future initiatives to enhance the research infrastructure at IIT?

[KC] A healthy and thriving Illinois Tech research enterprise is critical to the success of our university. Not only does it drive innovation and impact, but it creates a scholarly culture and community that attracts the best and brightest experts to teach and train our students. We are redoubling our efforts to ensure our involvement, and in some cases leadership, of larger-scale interdisciplinary efforts that address the challenges facing humanity. This requires us to ensure we are pursuing relevance-inspired research, i.e., research that translates to direct impact on society and industry. To complement this, we must also redouble our efforts to create a scholarly learning environment for our students where they can become experts in interdisciplinary scholarship and innovation so we can be a supplier of interdisciplinary research leaders into the market. Underpinning all of this is modernizing and expanding our research facilities on campus to meet current and future research needs to maximize our impact as an institution and as a training ground of research talent.

[ASP] Located in Chicago, how do you see the relationship between research at IIT and the city's socioeconomic development?

[KC] As noted above, our research should be relevance-inspired in its focus so that we are ensuring sustainable impact on society and industry. Our research should also lead to technology translation, entrepreneurship and economic impact. When we speak about societal impact, it is critical that this impact start in our own community by helping to support the needs of our neighborhood, city and region. We recently joined three large-scale research initiatives that fit this description: the Midwest Semiconductor Network, the Midwest Alliance on Clean Hydrogen, and the Chicago ARC initiative. This latter endeavor is a perfect example of this strategy as it is based in Bronzeville and is supporting innovative solutions to bridge the healthcare equity gap — both locally and beyond. Finally, engaging our community directly in our research activities can amplify its translational impact back to these constituencies (examples include pre-college programs that engage high school students and teachers in research, partnering with community organizations in developing new research initiatives, etc.).

Dr. Kenneth T. Christensen currently serves as Illinois Institute of Technology's interim provost and senior vice president for academic affairs. He joined Illinois Tech in November 2020 as the Carol and Ed Kaplan Dean of Armour College of Engineering. He holds a joint appointment in the Department of Mechanical, Materials, and Aerospace Engineering and the Department of Civil, Architectural, and Environmental Engineering. Christensen came to Illinois Tech from the University of Notre Dame, where he was the Viola D. Hank Professor and chair of the Department of Aerospace and Mechanical Engineering, with a joint appointment in the Department of Civil & Environmental Engineering & Earth Sciences.

He received a B.S. degree in mechanical engineering from the University of New Mexico in Albuquerque, an M.S. in mechanical engineering from Caltech, and a doctorate in theoretical and applied mechanics from the University of Illinois. Christensen served as Associate Director of the International Institute for Carbon-Neutral Energy Research (I2CNER) Satellite Center (2011–2014) while on the University of Illinois faculty, and also served as a WPI Principal Investigator in I2CNER until 2020. He is a Fellow of ASME (2012), APS (2103) and AAAS (2017), and an Associate Fellow of AIAA (2010).

MAHJOUB ELNIMEIRI

Interview Conducted by Piyush Khairnar, February 2023.

[PK] As a researcher and practicing engineer, what do you think are the challenges faced by contemporary cities today that need immediate attention?

[ME] The roles of engineers, architects, and planners should be more aligned when thinking about regenerative cities. Unfortunately, architects have abdicated their responsibilities in the last few decades. They have limited themselves to designing buildings according to the owner's wishes without considering other factors such as cost and the community's needs. An excellent example is the recent trend of building expensive tall buildings in big cities like Chicago. These buildings are only affordable for a few people, even the upper-middle class. The role of architects should not just be limited to designing buildings but also considering the social and economic well-being of the community. This includes creating a harmonious and healthy environment accessible to everyone, regardless of their economic status. Public parks are a great example of how architects can create a sustainable and healthy environment that benefits the community. The lakefront in Chicago is public, allowing everyone to enjoy this beautiful space. This creates a sense of community and promotes social interaction. Public parks and green spaces are essential for creating sustainable cities that are livable for all people. They provide a shared space for people to enjoy and promote social interaction. To create sustainable cities that accommodate the growing population, architects and engineers must work together and consider the community's needs. Achieving equity is crucial for creating a sustainable and thriving community. According to United Nations statistics, the world's population is expected to reach 12-13 billion by 2050, with over 70% living in urban environments. This highlights the importance of creating sustainable cities with equitable access to resources.

[PK] What do you think is missing in the current building design practices? How can research bridge the gap between the current reality and future aspirations?

[ME] Research is crucial in advancing knowledge and innovation, and academia and the industry must work together to bridge the gap between theory and practice. However, research cannot occur in a vacuum; it must happen as a result of need. The link between universities and the industry must be strong, and the curriculum must promote interaction between students and professionals to ensure that research advances are relevant to industry needs. Architects and engineers need to be aware of the latest advancements in materials, such as nanotechnology, and advanced composites and give feedback to researchers on how these materials can be used in practice. The research aims to advance knowledge for practice and help professionals take advantage of the latest design developments. Therefore, there must be an interaction between practice, academia, and research.

The curriculum should be geared towards advancing knowledge, and the faculty and students should be involved in research that enhances collaboration between other colleges. To achieve this, research funding is crucial, and it can come from the federal government or the industry. The industry is responsible for supporting research funding, especially when their problems are being solved. In some schools, research centers are funded by the industry, which obliges them to solve industry problems and help with their solutions. This creates a two-way relationship that benefits both parties.

In conclusion, research is essential in advancing knowledge and innovation, and academia and industry must work together to ensure that research is relevant to industry needs. The curriculum should promote interaction between students and professionals, and research funding should be available to support research.
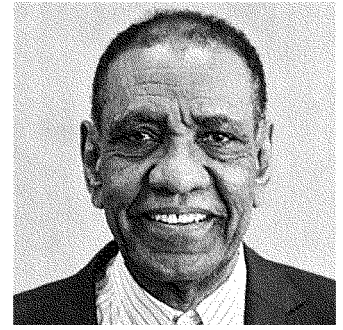
[PK] What role will tall buildings play in the regenerative design of cities?

[ME] One of the most challenging problems architects face is connecting tall buildings with the city to create a friendly and warm environment for those who live and work there. The connection between the building and the city is critical, but it becomes harder to integrate into the surrounding community as the building gets taller. Therefore, it's essential to address this issue and create a comfortable and safe environment for everyone.

In the future, cities will need to rely heavily on public transportation to prevent traffic jams and reduce pollution, making streets green and beautiful. Natural ventilation, beautification of surroundings, and a feeling of safety should also be critical considerations when designing tall buildings. Safety concerns have become increasingly important due to economic disparity and racial hatred. Therefore, creating an environment where people of all colors, genders, and backgrounds can live together without feeling uncomfortable is vital.

To address these issues, architects, designers, and engineers must collaborate and incorporate innovative approaches into their designs. For example, Peter Land looked at how to access tall buildings in a master's thesis project. Architects must also focus on creating plazas and other communal spaces where people can socialize.

Tall buildings have come under criticism from different perspectives, including their energy consumption. However, they can be beautiful places to live and work if designed correctly. Architects are responsible for creating sustainable and energy-efficient buildings that contribute positively to the cityscape.

[PK] What is the role and responsibility of researchers, designers, and planners toward using technology when creating urban environments?

[ME] The responsibility of architects, engineers, researchers, and professors is immense. They need to be aware of the impact that their technological advancements will have. Albert Einstein's example of the atomic bomb is a learning lesson, as technology can be used for destruction instead of progress. Therefore, the responsibility of scientists and other professionals is significant. Architects cannot just use advanced tools to build a structure quickly without knowing the consequences. Even though 3D printing, robots, and other technological advancements can help build a city, the vision of what could happen should be considered. Disaster can be avoided by preventing a disastrous outcome from happening. For example, skywalks and other architectural advancements must be carefully analyzed to ensure they work. Precautions need to be taken if an earthquake or any other disaster occurs. We should always lead and control technology, rather than technology controlling us. It is crucial to take responsibility for our advancements and ensure they positively impact society.

Dr. Mahjoub Elnimeiri is a professor at the College of Architecture at IIT, Chicago. He is a well-known expert in the structure of tall buildings and long span. He obtained his PhD in structural engineering and structural mechanics from Northwestern University in Evanston, Illinois. Dr. Elnimeiri then joined the SOM (Skidmore, Owen, and Merrill) office in Chicago 1979. He left SOM as an associate partner and senior structural engineer in1990 to join the College of Architecture as a full professor.

Dr. Elnimeiri founded the PhD program in Architecture at IIT in 1996 and directed it until 2013. In addition to research in structure within architecture, he contributed to developing and conducting research in the areas of energy and sustainability. Dr. Elnimeiri has been invited as a keynote speaker frequently, has contributed significantly to the field with research publications, and has been a peer reviewer in multiple scientific journals.

MOHAMMAD HEIDARINEJAD

Interview conducted by Piyush Khairnar, February 2023.

[PK] Buildings constitute a large portion of our built environment. What role can regenerative practices play in the design of our built environment?

[MH] Regenerative practices are among the much-needed assets that we have to design our built environment and to restore our existing aging built environment. More than ever, we are appreciating the emphasis on regenerative practices as it has become more evident recently. Regenerative design practices are a forward-thinking approach to incorporate novel solutions to our built environment such as including green roofs and green skins, capturing rainwater, and enhancing energy efficiency in buildings while improving thermal with the use of efficient construction materials. While these are a few examples of practices that have been around and we have been using, we always need novel solutions to implement regenerative design practices.

[PK] What do you think is missing in current building design practices? How can research bridge the gap between the current reality and future aspirations?

[MH] Historically, cost was a major setback in applying most regenerative and innovative design practices that made them cost prohibitive. Climate change made people more aware of the built environment and our footprint on our environment. This is a very critical era for us to support research and design practices that did not receive attention before. I believe a pathway to bridge our regenerative design objectives with our futuristic aspirations. To ensure the widespread adaptation of novel and equitable solutions, all stakeholders in a building design should work together.

[PK] The field of design is witnessing an increase in technological advancements. What is the role of technology in the current design trends? Do you see technology as merely a tool or a solution to problems faced by humanity?

[MH] I see technological advancements as both a solution to problems and also a tool to solve problems. I have worked on novel technological advancements such as innovation in the field of deploying radiative cooling materials to the U.S. building stock, developing control sequences to operate insulating shades in Willis Tower, or assessing novel control strategies to operate ETFE (Ethylene Tetrafluoroethylene) in our Kaplan Institute building. One aspect that has emerged from all of these studies is we are fortunate to live in an era to be part of all these innovations while we need to make sure all these technological advancements are assessed in reality rather than just a pure modeling. Any technological advancement will become more reliable and applicable when they are evaluated under realistic conditions in actual buildings.

[PK] As part of the regenerative design trend, how can we leverage the available technology, for example simulation tools and artificial intelligence, in academic research? How can one translate this technology use in practice?

[MH] Technological developments in recent years, such as developing building simulation tools, utilizing powerful artificial intelligence algorithms, and creating digital twins, have led to a paradigm shift in our design practices. For example, building energy simulation tools first introduced a few decades ago to conduct simple energy predictions and or peak load sizing of building equipment. Then, they have evolved overtime to account for all the underlying heat transfer processes and provide detailed prediction results. Right now, not only do we have advanced building energy simulation tools, but they are also able to communicate and exchange data with other simulation tools such as air flow, lighting, and life cycle analysis at both building and urban scale, enabling a holistic approach to model our built environment. Similarly, artificial intelligence has changed our way of using the data generated by simulation tools or our building performance data. These are just examples of how technological advancements can assist with the regenerative design practices. However, translation of these technological advancements to actual designs requires careful considerations. Simulation tools or technologies are power assets to assist with the design, but they are as good as their assumptions and use cases. Looking back at the building energy simulation tools example, the reliability and applicability of the results depend highly on the inputs and assumptions that are used. Currently, most simulation tools provide default templates that facilitate the learning curve for young scholars, but the results do not necessarily reflect the actual design intention in reality. To translate the technology
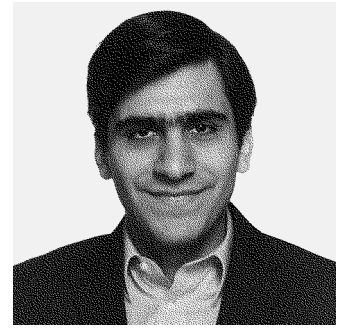
advancements to actual design practices, we need to ensure our next generation of designers are educated on how to use these resources and assets correctly while we allow critical thinking to play a major role in pushing boundaries.

[PK] The use of technology to design performative building environments is evident in energy resiliency, thermal comfort, and construction efficiency. How can designers leverage technology in addressing socioeconomic inequities in contemporary urban society?

[MH] We can address any socioeconomic inequities in contemporary urban society when all the stakeholders come together. A design solution or policy without bringing all the stakeholders together will not be effective and equitable. As an example we can look at the decarbonization of our building stock. We should be open to evaluating all viable decarbonization pathways of our building stock. Experts with different perspectives, homeowners from different neighborhoods, policymakers with a diverse vision, developers, contractors, and ultimately designers—in general all stakeholders—should be represented. Then, we should be able to address timely challenges and opportunities to decarbonize our building socks and propose novel, resilient, equitable, and affordable decarbonization pathways using different resources such as regenerative design practices.

Dr. Mohammad Heidarinejad is an assistant professor in Civil, Architectural and Environmental Engineering. His expertise includes building science, multi-scale modeling of the built environment, building energy and environmental measurements, energy-efficient buildings, building energy simulations, computational fluid dynamics, building control, and sustainable and smart cities.

His research interests center around multi-scale modeling of building energy systems in the built environment to understand relative significance of the heat transfer processes, energy-use pattern classification of building energy systems to design energy-efficient buildings and develop opportunities to retrofit existing buildings, application of high performance computing for modeling building energy systems in the built environment to design sustainable and smart cities, and monitoring environmental conditions and airflow patterns to quantify impacts of building control on occupants' thermal comfort and health outcomes.

FRED HICKERNELL

Interview conducted by Alejandro Saldaña Perales, February 2023.
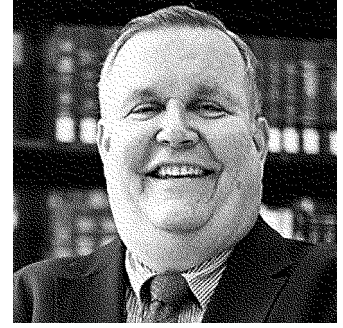
[ASP] What, in your view, are the challenges and opportunities of interdisciplinary research, especially in the post-pandemic era?

[FH] Our ability to communicate virtually has increased dramatically during the pandemic. Easy virtual communication fosters research collaboration. However, certain long-standing challenges persist. Each discipline brings its own culture and language to a research problem. Interdisciplinary researchers must be intercultural, which takes concerted effort. Government funding for interdisciplinary and interdisciplinary teams to address complex problems is growing, which brings great opportunity. But, interdisciplinary team building is a challenge. Illinois Tech faculty can be key team members. Our modest size makes it easier to know and partner with others inside Illinois Tech but outside our own disciplines. However, our smaller size sometimes makes it easier to be overlooked as a valuable team member by other institutions. We need to make our voices heard.

[ASP] How do academic and professional collaborations foster research and innovation within the student communities?

[FH] My hope is that all Illinois Tech students become part of a research or innovation team. Students with little experience or expertise can volunteer to complete a small project, which will give them valuable experience to progress to more impactful work. This should be especially suited for architects who thrive on project work. Many research groups have members who are a bit further along in their journey, and they should be relied on for help. Students should ask their professors questions why things are done a certain way. Taking courses outside a student's main discipline often provides the insight to make a research breakthrough.

[ASP] What is the current state of research and development in an academic setting? From your perspective, what key lessons should aspiring scholars address in the future?

[FH] Research funding is increasingly directed towards i) interdisciplinary topics and ii) translating basic research into impact. The recently created NSF Technology, Innovation and Partnerships Directorate is an example. This trend in research funding provides opportunities for architects, who always aim to see their ideas put into practice and who recognize the spectrum of ideas required to innovate.

Aspiring scholars must learn how to go deep enough to gain new insight, while being agile enough to address problems that academics and society care about. Holding depth and agility in tension is a challenge.

[ASP] What are the current and future initiatives to enhance the research infrastructure at IIT?

[FH] Illinois Tech has recently joined consortia of academic and industry partners in areas of interest to the government, such as microelectronics, the hydrogen economy, and advanced manufacturing. Our research institutes — the Institute for Food Safety and Health, the Pritzker Institute of Biomedical Science and Engineering, and the Wanger Institute for Sustainable Research — are actively forming new partnerships to address pressing problems. Overall, Illinois Tech is leveraging our resources to bring the greatest impact.

[ASP] Located in Chicago, how do you see the relationship between research at IIT and the city's socioeconomic development?

[FH] Illinois Tech's location gives us a better view of Chicago's challenges, such as health equity, energy resilience, and access to safe and healthy food. Our academic community is addressing these and other challenges, not only for Chicago's sake, but for global impact. Beyond fundamental and translational research, Illinois Tech can help educate the diverse workforce of the future and provide economic opportunity for the next generation.

Dr. Fred Hickernell is Vice Provost for Research and professor of applied mathematics at the Illinois Institute of Technology (Illinois Tech). Fred works on elevating Illinois Tech's research. This includes connecting faculty with external funding opportunities, promoting the formation of interdisciplinary research teams, supporting the preparation and submission of proposals, and ensuring that research is conducted with integrity. Fred has been an Illinois Tech faculty member for 18 years.

Prior to being Vice Provost for Research, he served as chair of the Department of Applied Mathematics and director of the Center of Interdisciplinary Scientific Computation. Among his many awards are his fellowship in the Institute of Mathematical Statistics, his membership in the International Statistical Institute, Dean's Excellence Award for Research in 2007 and 2017, and the 2016 Joseph F. Traub Prize for Achievement in Information-Based Complexity. He received his B.A. in mathematics and physics from Pomona College and his PhD in mathematics from Massachusetts Institute of Technology.

HYESUN JEONG

Interview conducted by Piyush Khairnar, February 2023.

[PK] As a researcher, what do you think are the challenges faced by contemporary cities today that need immediate attention?

[HJ] We live in various contingencies today driven by economic crisis, environmental problems, and inequity issues in the global context. While these problems are complex, I think climate change is the most urgent and resonating issue that more cities are trying to respond to and solve through sustainable urban development.

[PK] At a macro scale of design interventions, how can we leverage urban design as a tool to mitigate the effects of social inequities and climate crises in cities?

[HJ] Urban design requires interdisciplinary collaborations and applications of theory and knowledge in architecture, planning, and policy to draw larger implications to the built environment. Therefore, approaches of urban design can be mixed and inclusive, while mitigation for social inequities and climate crises should be rooted in the discourse of global and local-specific urban contexts.

[PK] Regenerative design is an emerging concept that looks beyond sustainable design. How can regenerative design principles be integrated into the planning and development of cities to promote better urban life?

[HJ] Given the depletion of resources, future generations will live in the era where they compete for water, food, and energy. A lot of regenerative design is currently more discussed in the subject of building technology. However, to support better quality of urban life, regenerative design should be more widely applied to planning and urban design by integrating ecological landscape, adaptive reuse of infrastructure, and design of streets that accommodate pedestrian and mobility of active transportation, which all shape both physical and social realms of cities.

[PK] Community engagement is a crucial aspect in urban development. How can urban designers collaborate with local communities and stakeholders to promote regenerative practices in cities?

[HJ] Community engagement is always a challenging but rewarding process of urban development. In regard to sustainable development, I believe public awareness is still lacking in many cases, while it is most important. Public education helps citizens learn broad effects of climate change on all parts of quality of life, health, and economy. Workshops and design charrettes provide a platform of communication and open conversation of issues that could resonate the need for regenerative practice in different scales.

[PK] As part of the regenerative design trend, how can we leverage the available technology, for example simulation tools, artificial intelligence in academic research? How can one translate this technology use in practice?

[HJ] While regenerative design was originally developed to improve the quality of "human" life, a lot of academic research using simulation model and artificial intelligence tend to overlook the other intrinsic complexity of a place, such as history, social and cultural integration, jobs, and population shifts that actually determines how and where we live in reality. We should remember that while technology has moved forward, it was not always the best answer for all the problems. For example, when the automobile was a postwar American dream, people could not predict how this would shape American cities today. Now, we see similar conversations about the future of autonomous vehicles. I think real-world testing and surveys from occupants could help realistic and practical applications of technology in design.

Dr. Hyesun Jeong, PhD, Assoc. AIA is an assistant professor of urban design at the University of Cincinnati (UC) and a co-director of the Orville Simpson Center for Urban Futures. Dr. Jeong's interdisciplinary research studies the built and cultural environment of global cities. Topics of her research and design studio include arts and cultural placemaking, Main Street, sustainable transit, and ecological urbanism.

Prior to joining UC, she previously worked at the University of Texas at Arlington and the University of Chicago. She obtained a PhD in Architecture from the Illinois Institute of Technology. She has practiced at various global design firms, including Goettsch Partners (Chicago), Dominique Perrault Architecture (Paris), and POSCO Architects and Consultants (Seoul). Her research has been published in top peer-reviewed journals, including *Cities and Urban Affairs Review*, and book chapters. Recently, her research-design project on green infrastructure received a national award from the American Institute of Architect's Upjohn Grant Initiative program.

BARBARA KENDA

Interview conducted by Piyush Khairnar, February 2023.

[PK] At a macro scale of design interventions, how can we leverage urban design as a tool to mitigate the effects of social inequities and climate crises in cities?

[BK] As cities expand, they bring about various crises that urban design must resolve. To create sustainable and equitable neighborhoods, towns, and cities, urban design must focus on Regenerative Design, Walkability, Green Living, Green Energy, Holistic Design, and Community. These interventions will help reduce social inequalities and mitigate climate crises.

The city of Ljubljana is a prime example of urban design that embodies these principles. The Slovenian capital was designed by Joze Plecnik, whose focus on human-centered, sustainable, and regenerative urbanism set him apart from his contemporaries. Plecnik created an architectural and urban language that respected the city's historical and cultural layers while meeting the needs of modern society. He also emphasized the harmony between built and natural environments, creating green spaces such as promenades, parks, and gardens that promote the well-being of all inhabitants.

Ljubljana is now considered one of Europe's greenest and most livable cities, with 70 percent of the city covered by urban landscapes and 542 sq.m. of green area per citizen. The city's citizens have been involved in urban and architectural decision-making, creating reusable and multifunctional spaces for cultural, educational, and ecological forums that increase social interactions, inclusivity, and equity.

In the past, Ljubljana suffered from congested traffic and air pollution. However, Plecnik''s design interventions and elimination of motorized traffic in the historical center have transformed the city into a unique urbanistic and architectural monument. Today, pedestrians and cyclists are the focus, and the city''s design promotes a balanced and symbiotic relationship between the built and natural environments.

[PK] Community engagement is a crucial aspect in urban development. How can urban designers collaborate with local communities and stakeholders to promote regenerative practices in cities?

[BK] Success starts with education. Urban design students should have adequate opportunities for out-of-classroom engagements with communities, designers, and other professionals to gain valuable knowledge for their future careers. Success persists with continuing education. Professionals should be involved in vigorous learning experiences, including community collaborations, to design regenerative

cities. To successfully promote regenerative practices, students, urban designers, and stakeholders should learn from communities about their needs and wishes and involve communities in their urban design process.

One of my most memorable experiences was working for The Prince's Foundation, UK, which has focused on building and revitalizing communities to improve people's lives locally and internationally. The foundation has collaborated with diverse communities, students, scholars, urbanists, architects, and other experts to create sustainable, and regenerative built and natural environments. For instance, within the past few decades, the foundation has organized numerous continuing education events — inclusive conferences and workshops to promote holistic and regenerative urbanism and architecture. The foundation's direct engagement with communities through education and practice is an integral part of such successful collaboration. Such engagements occurred at the foundations' premises and the communities' diverse sites. Mutually respectful relationships between designers, communities, and stakeholders are vital for any neighborhood, town, and city to be thriving and human-centered.

[PK] What do you think is missing in current building design practices? How can research bridge the gap between the current reality and future aspirations?

[BK] The field of urbanism and architecture has been lacking in the dimension of preventive design. While sustainable and regenerative practices have been inspiring, there has been a lack of interdisciplinary research and collaborations with medical sciences. Preventive design, similar to preventive medicine, can help support our design practices before there is a need to treat or reverse any damage. Furthermore, indoor and outdoor environments directly affect many chronic and infectious illnesses, making preventive medicine powerless without being supported by design practices. Preventive architecture and urbanism will reinforce design disciplines and assist in improving physical and mental health. By addressing ethics and social justice, preventive design will ensure that all people, regardless of status, live in healthy buildings, communities, and cities.

The concept of preventive design is not new, as it was already present in Classical and Renaissance architecture. For instance, in his treatise *De Architectura*, Vitruvius reiterates medical discoveries from Hippocrates' book *Airs Waters Places*. At the same time, Renaissance humanist Alvise Cornaro wrote both a treatise on architecture and

medicine. He successfully applied his interdisciplinary theories into practice — particularly in his house, Odeon, Padua, where he reportedly reached an age short of a century. Palladio, Scamozzi, and other Renaissance architects further refined the embodiment of preventive medicine in their theories and practices to promote the art of well-being. Architects during those periods focused on the medical and pneumatic aspects of aesthetics. Renaissance architects refined the embodiment of preventive medicine in their theories and practices to promote the art of well-being. However, architects in the 20th century mostly ignored health equations in their designs. It is now more important than ever to intensify interdisciplinary collaborations between architecture, urbanism, and medicine, especially after learning many lessons from the COVID-19 pandemic.

[PK] How should we think about regenerative design as a tool? How can architects and designers create buildings that support the natural landscape rather than exploit it?

[BK] During the Renaissance, builders deeply understood and empathized with natural environments. After exploring the local landscapes and environmental phenomena, they carefully selected building sites, seeking a mutually respectful relationship between their constructions and nature. The pneumatic edifices in Costozza, Italy, are prime examples of this holistic approach. These villas, linked by gardens and underground tunnels, utilized the breathing landscapes of Berici Hills to create a natural ventilation system that provided fresh air and thermal equilibrium throughout the year.

In his book *The Invisible Pyramid*, Loren Eisley reminds us that we need to incorporate the wisdom of axial thinkers to develop an ethic that includes our living world. We must strive for sustainable and regenerative practices to minimize, repair, reverse, and prevent further damage caused by our evolutionary displacement from nature and its landscapes. We must design holistic environments where architecture and nature can support each other.

The Jaisalmer school project in the Indian desert town, designed by architect Diana Kellogg, is an inspiring example of such a relationship. The structure is positioned according to the prevailing winds to amplify natural ventilation forces. The walls are constructed of traditional climate-resilient, and locally sourced sandstone and porous lime mortar to cool the spaces and decrease moisture. The building does not require mechanical air conditioning, reducing its overall environmental impact. The winds, the natural golden stone, and the surrounding golden desert landscapes create mutually supportive properties between architecture and nature.

[PK] The field of design is witnessing an increase in technological advancements. What is the role of technology in the current design trends? Do you see technology as merely a tool or a solution to problems faced by humanity?

[BK] Technologies can potentially solve some of humanity's greatest challenges in design, but only if they prove effective, safe, and ethical in the long term. History has shown that enduring technologies can teach valuable lessons in building and reversing environmental and social crises. For instance, ancient structures like the Roman Pantheon, the walled city of Sana, Cappadocia's underground cities, and Matera's rainwater collection system demonstrate resiliency and durability that we can learn from.

A holistic approach to technology that combines past wisdom with present knowledge is necessary to create advanced technologies that benefit humanity. This Janus-faced approach allows us to explore the best of both worlds and design performative buildings and cities that are energy-resilient, thermally comfortable, and constructed efficiently. However, social justice and equity must also be considered in technology design, as no technology can be truly successful if it is not available, affordable, safe, and healthy for all.

Overall, the design field must consider technologies' economic, social, environmental, scientific, and ethical implications to ensure they truly benefit humanity. By learning from the past and innovating for the future, we can create effective and equitable technologies, leading to a brighter and more sustainable future for all.

Dr. Barbara Kenda's interdisciplinary research explores architecture, urban landscapes, preventive medicine, climate, and human rights. As a professor or adjunct faculty, she has taught architecture at Notre Dame, Virginia Tech, and other universities. She is a former director of education, The Prince's Foundation for the Built Environment, London; visiting scholar, University of Pennsylvania (History of Science and Sociology-Medicine); and fellow in Landscape Studies, Dumbarton Oaks, Harvard. Barbara has organized conferences and has lectured internationally, including at Harvard GSD symposium Atmospheres.

Among her publications are: *Aeolian Winds...* (Ed., Routledge); *Green Living...* (Ed. Et. Al., Rizzoli); *"Pneuma in Villa Eolia..."* (Peabody Museum, Cambridge) and several others. For her scholarship, design, and teaching, Barbara has received: Penfield and Salvatori Awards; grants by Graham, Kress, Delmas and other foundations; Shreve Award for Excellence in Architectural Design (Cornell); and other recognitions. Her degrees include: BA (University of Ljubljana); MA (Cornell); MS, PhD (University of Pennsylvania).

INDRANEEL KUMAR

Interview conducted by Piyush Khairnar, February 2023.

[PK] As a researcher, what do you think are the challenges faced by contemporary cities today that need immediate attention?

[IK] Outdated, functionally obsolete, and structurally deficient infrastructure systems are major challenges for almost every contemporary city. Optimum supply, and right-size and proper planning for infrastructure is much needed. In addition, I think the growing inequalities and inequities need immediate attention. Nowhere the distinction between "haves and have nots" is more visible than our contemporary cities irrespective of their locations. At the same time, I have a lot of hope in urbanism because our cities have been cradles for innovation, experiments, and bold visions.

[PK] At a macro scale of design interventions, how can we leverage urban design as a tool to mitigate the effects of social inequities and climate crises in cities?

[IK] Urban planning or city planning happens at a much larger scale and usually it is difficult for residents to comprehend the geographic scope. Residents experience the city at the urban design and street levels through day-to-day activities of shopping, playing, enjoying the open spaces, going to work, dropping the kids at school, walking to school, biking, etc. It is where the interactions happen and memories are made.

There has been a mixed bag of successes and failures to handle the issue of social inequities in cities. Maybe the starting point should be "housing." There have been several attempts to develop and promote mixed-income housing in neighborhoods in developing, as well as developed, countries. I would mention two such efforts by the late Professor (Dr.) B. V. Doshi, who received the Pritzker Architecture Prize in 2018 and RIBA Gold Medal for Architecture in 2022. His social and architectural experiments with mixed-income housing for Aranya Low-Cost Housing and LIC Housing in India show, in part, that architecture, built form, and neighborhood planning can achieve success in addressing some aspects of inequities.

Climate change brings in a major challenge for architects, urban planners, and civil engineers. Imagine the need for retrofitting the bridges, culverts, buildings, roads, runways, drainage, etc., as the atmosphere gets warmer! Densely populated areas with significant imperviousness in the land cover will experience unprecedented heat island effects. Again, the scale of interventions should be at the urban design level, neighborhood level, etc., because it is more tractable and also "learning by doing" or "tactical urbanism" can be done at this scale.
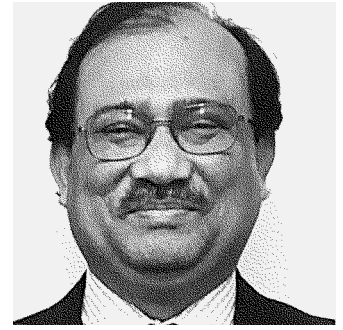
[PK] Regenerative design is an emerging concept that looks beyond sustainable design. How can regenerative design principles be integrated into the planning and development of cities to promote better urban life?

[IK] I am excited about the regenerative design because it moves beyond the net zero carbon footprint to think how the architecture and built form can be integrated into the ecosystem. City planning is a ripe field for thinking about applications of regenerative principles. Biomimicry and learning from organisms are happening in engineering disciplines with implications for planning. For example, movement of millions of locusts in a swarm without collision can teach something about the autonomous driving algorithms. Scientists are learning about stronger material for airplanes by studying the composite structure of mantis shrimp club. How can we design and plan neighborhoods as ecological units? For example, can neighborhoods also function as groundwater recharging systems in areas of water scarcity and depleted groundwater levels such as India, Bangladesh, etc.? Generally, neighborhoods and subdivisions are designed to cause surface water runoff, however, thinking of them as a groundwater recharging system in addition to places for living and day-to-day activities require a paradigm shift.

[PK] Community engagement is a crucial aspect in urban development. How can urban designers collaborate with local communities and stakeholders to promote regenerative practices in cities?

[IK] Community engagement is important and vital for acceptance and adoption of comprehensive plans, zoning policies, and building regulations. Especially at the local government level, where referendums are required for decision making, community engagement can make, or lack thereof can break, the initiative. Regenerative design and practices will require a lot of education and engagement at the community level. Appreciative inquiry, social networks in the community, power structure in the community, identifying the emerging leaders and champions, and community capitals are some of the ways that can be followed. More importantly, regenerative principles are new and engaging communities around this idea will require grassroots efforts and patience.

Dr. Indraneel Kumar serves as a principal regional planner and an interim assistant director of research at the Purdue Center for Regional Development. He has a bachelor's degree in architecture from VNIT (India), master's in urban and regional planning from CEPT University (India), master's in community planning from University of Cincinnati (USA), and a doctorate in transportation and infrastructure systems from Purdue University (USA).

In more than two decades of professional experience, he has worked on comprehensive planning of large metropolitan areas in Asia and the U.S., and local and regional economic development programs in various states. He has been engaged in research funded by the U.S. Economic Development Administration, Economic Research Service USDA, Microsoft Corporation, Office of Economic Adjustment Department of Defense, and various state governmental agencies in Indiana.

NADIA MOUNAJJED

Interview conducted by Piyush Khairnar, February 2023.

[PK] As a researcher and practicing architect, what do you think are the challenges faced by contemporary cities today that need immediate attention?

[NM] For the first time in human history, more people live in cities than in rural areas. Seventy-five percent of all-natural resources are consumed in cities and 50 percent of all waste is generated in urban areas. Today, some 56 percent of the world's population (that is 4.4 billion inhabitants) live in cities. This trend is likely to continue, with the urban population expected to double by 2050. This will strain resources and cause many challenges. Many cities are already suffering from inequality, high density, limited access to water, food insecurity, waste management, and space segregation. Cities are also increasingly prone to natural hazards (seismicity, fire risk, sea level rise, flooding, etc.). All this requires research and a design mindset that will help make our cities more resilient. We have a recent live example from the deadly earthquake in Turkey and Syria that killed thousands of people and destroyed whole neighborhoods. The damage was more impactful because of the poor infrastructure. With growing densities in cities, such disasters coupled with poor infrastructure can leave people in highly vulnerable conditions with little access to safe shelter, fresh water, heating, and food.

[PK] Community engagement is a crucial aspect in urban development. How can urban designers collaborate with local communities and stakeholders to promote regenerative practices in cities?

[NM] Involving the community empowers people to design their own future. It ensures their engagement so that the future of regenerative cities does not become another utopian vision disconnected from the reality of our societies. The pre-design phase is a critical phase to start this engagement through an open dialogue that includes all stakeholders. Designers can integrate social equity into the project early on by undertaking a community needs assessment, focusing on accessibility, or by studying the history of the surrounding community and making it a meaningful and inspiring part of the project. Architects, researchers, and planners may ask questions such as: Can the project identify the most pressing public health, equity, social, and economic issues of the surrounding community in which it is located? Can the project provide access and/or programming that address an existing gap or meet a current need within the building for use by the surrounding community? Designers can also ensure continuous input throughout the design and construction processes by maintaining communication with a broader group of stakeholders, including but not limited to: community leaders, occupants, facility personnel, public health professionals, government officials, union organizations, neighborhood entrepreneurs and business leaders, educational and cultural institutions, and local artists and designers.

[PK] How should we think about regenerative design as a tool? How can architects and designers create buildings that support the natural landscape rather than exploit it?

[NM] Architects and researchers can adopt regenerative design principles in their everyday practice by giving priority to restoring vital elements such as livability, equity, ecosystems, food security, accessibility, waste management, and access to clean water. Passive design strategies can improve daylighting and reduce heating and lighting costs. Innovative environmental design ideas can also help to improve societal resilience, restore planetary health, and regenerate ecological systems. The adoption of adaptive reuse is also imperative for regenerative cities. Reinvesting in the building stock through thoughtful adaptive reuse will help avoid further consumption of not only building materials but also open space, clean air, and precious natural resources.

[PK] As part of the regenerative design trend, how can we leverage the available technology, for example simulation tools and artificial intelligence, in academic research? How can one translate this technology use in practice?

[NM] Building energy simulation and environmental assessment can help in the design of environmentally friendly structures. Energy efficiency, material transparency, and ecological balance can all be improved by identifying and analyzing patterns of water and energy use, pollution, waste processing, and material usage. Many tools that support the design of regenerative cities, such as Building Information Modeling (BIM), Environmental Impact Assessment (EIA), and Life Cycle Assessment (LCA) involve complex calculation processes. Also, a lot is now being said about open data. Open data is a critical component of future regenerative cities, as it represents a wealth of information that can be leveraged to improve communications, foster innovation, generate economic activity, and enhance livability. An informed decision-making process is critical to maximizing a city's impact with increasingly constrained resources.

[PK] The use of technology to design performative building environments is evident in energy resiliency, thermal comfort, and construction efficiency. How can designers leverage technology in addressing socioeconomic inequities in contemporary urban society?

[NM] Good design must be accessible to all, regardless of their social and economic background. The use of high-performance building envelopes does not always require costly structures, high technology, or systems. Passive design strategies maximize occupant shelter and comfort through natural lighting and ventilation, while also increasing energy efficiency and reducing life-cycle costs. Designers are encouraged to think creatively to ensure that buildings are well designed to meet the comfort needs of their users and to consider passive design early.

Dr. Nadia Mounajjed is an associate professor of architecture at Abu Dhabi University. She is also a member of the RIBA Committee on Education and Learning, an international member of the AIA, and a LEED Green Associate. Her work investigates body politics, space, and participation in architecture, as well as cultural intersections between art and architectural design.

She is the editor of *Visual Culture(s) in the Gulf: An Anthology* (Gulf Research Center, 2016) and the author of a few papers and book chapters, including "Reflections on Public Art in the Arabian Peninsula" (Routledge, 2018) and "Juvenile Improvisations: Designing for Youth in Abu Dhabi" (Routledge, 2020). She holds a PhD from Sheffield University and a M.Arch. from the Bartlett School of Architecture in London.