

APA FORESIGHT

Trend Report for Planners

Use the future when preparing for uncertainty and helping communities navigate change. Stay a step ahead of the issues impacting the future of planning and our communities. Brought to you by the American Planning Association and the Lincoln Institute of Land Policy.

American Planning Association Creating Great Communities for All

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OF LAND POLICY

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Trends and Signals for 2024

The trends in this report are structured in three timeframes, which indicate the urgency of planners' action. Within each timeframe, trends are grouped into themed clusters (in alphabetical order).



Act Now

The Al Era

Looming <u>Climate</u> <u>Impacts</u> and Adaptation Challenges

<u>Climate Mitigation:</u> Skilled Workers, Tech, and Policies

Housing Challenges and Solutions

Political Polarization and Societal Division

Persisting <u>Transportation</u> Inequities

The Value of <u>Youth</u>



Prepare

<u>Global Dynamics</u> and a New Economic Landscape

Immersive City for and by the People

Job Evolution and Revolution

Moving Toward a Polycrisis

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Continuing Changes in <u>Work and Retail</u>



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Innovations in the <u>Energy</u> Sector

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Curiosities and Game-Changing <u>Innovations</u>

The New Space

Special Features SCENARIOS

2034: The Futures of the (Home) Office2044: The Futures of Decision-Making in Planning

2054: The Futures of Global Climate Action

DEEP DIVES

The Silent <u>Health Crisis</u> Planning for a <u>Hybrid</u> <u>World</u> The Futures of <u>Food</u> <u>Production</u>

EXPERT INTERVIEWS

A World With <u>Less Water</u> The U.S. <u>Infrastructure</u> <u>Crisis</u> ChatGPT Talks About the <u>Futures of Al</u>

The framework



About This Report

Methodology



Trend Universe

About This Report

This is the third *Trend Report for Planners* developed by the American Planning Association (APA) in partnership with the Lincoln Institute of Land Policy.

As in previous years, the core of this *Trend Report* is a list of over 100 existing, emerging, and potential future trends that the APA Foresight team, together with our <u>Trend</u> <u>Scouting Foresight Community</u>, identified as relevant to planning. The trends are structured within three timeframes (Act Now, Prepare, Learn and Watch), indicating the urgency of planners' action. Within each timeframe, trends are grouped into themed clusters. For each trend, the report gives insights and explains why it is important for planners to know about and consider the trend in their work. All trends and signals are based on facts and are described neutrally and without judgement. The purpose of the report is to share potential drivers of change and shifts that will possibly impact the work of planners and the communities we serve as planners. While most of the trends and signals from previous *Trend Reports* are still relevant, we didn't repeat them in this *Trend Report* unless there were major updates that were important to highlight. All trends and signals from this report and previous reports are now also available online in <u>APA's Trend Uni-</u> <u>verse</u> where they will be regularly updated, reflecting the accelerating pace of change today and in the future.

Furthermore, the report addresses the future of planning, explaining how the planning profession will have to evolve to keep up with a continuously changing world, what new skills planners will have to develop, and which new tools are worth trying.

Additional features throughout this report include deep dives, future scenarios, and expert interviews. This year's **deep dives** highlight two crises that are not always at the top of every planning agenda but have deep connections to planning: the silent health crisis and what planners can do to mitigate it, and the global food crisis and signals of what the future of food production and agriculture might look like. Additionally, we dive deeper into the topic of planning for a hybrid world—a world where people can choose for almost any activity whether they want to do it online or in person and what that might mean for the future of planning.

Based on different trends and signals, we also did some time travel and created a variety of **future scenarios**. These scenarios are examples of how planners can use the trends from this report to create multiple plausible futures of their own communities and how they might affect the path forward. We looked at the year 2034 and the question of how the housing crisis together with remote work trends

might play out in the future. We traveled to the year 2044 to better understand how the uncertainty about political polarization and the fast pace of artificial intelligence (AI) innovations might affect the work planners do. And we explored plausible scenarios for the year 2054 on how the futures of geoengineering and related potential climate change mitigation might play out in a world that is currently moving towards deglobalization. For more information on scenario planning, you can visit APA's Scenario Planning KnowledgeBase Collection and the Lincoln Institute's Consortium for Scenario Planning.

Finally, this year's report features **expert interviews** with two of our trend scouts on two other crises in which planners might want to get more involved: the water crisis and the U.S. infrastructure crisis. And we asked ChatGPT to interview itself about the future of AI.

How to use this report

The *Trend Report* is intended to be used as a tool or reference when planning for the future of our communities. Planners can use the trends listed in this report as input for their long-range and current planning processes, to practice strategic foresight during <u>community</u> <u>visioning</u> processes, for <u>scenario</u> <u>planning</u>, or simply to inform future decision-making.

To determine and prioritize the most important trends to consider, planners can evaluate and rate the trends based upon (1) the expected extent and severity of the potential impact, and (2) how certain or uncertain it is that a trend will occur in a community. The Trend Prioritization for Planners graph demonstrates how these two factors interact in the evaluation of trends. Trends in the upper right quadrant of the graph—high impact and high certainty-represent the top-priority trends for planners to pay special attention to.

In addition to APA's *PAS Quick-Notes* 94, "<u>Planning With Foresight</u>," which briefly describes how you can use the multiple trends of this report in a foresighted approach, we developed an interactive online course on how you can make sense of the future, train your futures-literacy muscles, and use foresight in your work: Using the Future to Create Dynamic Plans. The course offers approaches on how you can identify trends and signals in your community together with your community members, how you can prioritize and focus on the most important trends, how you can imagine what the future might look like, and how the practice of foresight can help you create dynamic plans that allow you to pivot along the way while the future is approaching. Using the future when planning to shape the future of our communities will result in more equitable and resilient outcomes.

Trend Prioritization for Planners

HIGH CERTAINTY



LOW CERTAINTY

APA FORESIGHT: Using the Future to Create Dynamic Plans CM | 6

This upskilling course, Using the Future to Create Dynamic <u>Plans</u>, gives planners the ability to imagine multiple plausible futures. use the future in our work, and plan with the future. This interactive self-paced training includes how to use strategic foresight in planning with applicable tools and methodologies to equip planners with the essential skills needed to navigate change and understand how future uncertainties may impact communities.

About the American Planning Association

The <u>American Planning Association</u> is an independent, not-for-profit educational organization that provides vital leadership in creating great communities for all. APA and its professional institute, the <u>American Institute of Certified Planners</u>, are dedicated to advancing the profession of planning, offering better choices for where and how people work and live. The nearly 40,000 APA members work in concert with community residents, civic leaders, and

business interests to create communities that enrich people's lives. Through its philanthropic work, the <u>APA Foundation</u> helps to reduce economic and social barriers to good planning. APA is based in Chicago.

APA Foresight learning with the future

<u>APA Foresight</u> helps planners navigate change and prepare for an uncertain future. With foresight in mind, planners can guide change, create more sustainable and equitable outcomes, and establish themselves as critical to thriving communities. Foresight is not about

understanding drivers of change that are outside of our control, how we can prepare for them, and when it is time to act. APA Foresight identifies emerging trends and explores how scenarios stemming from each may impact the world, our communities, and the planning profession in the years to come. The path forward requires adjusting, adapting, and even reinventing planning processes, tools, and skills to meet the needs of a changing world. Through APA's foresight practice, planners will find support, training, and new research for making sense of ever-changing futures.

predicting the future—it is about







About the Lincoln Institute of Land Policy

The Lincoln Institute of Land Policy seeks to improve quality of life through the effective use, taxation, and stewardship of land. A nonprofit, private operating foundation whose origins date to 1946, the Lincoln Institute researches and recommends creative approaches to land as a solution to economic, social, and environmental challenges. Through education, training, publications, and events, we integrate theory and practice to inform public policy decisions

worldwide. We organize our work around thematic areas: fiscal systems; land markets and opportunities; and climate, land, and water. We envision a world where cities and regions prosper and benefit from coordinated land use planning and public finance; where communities thrive from efficient and equitable allocation of limited land resources: and where stewardship of land and water resources ensures a livable future. We work globally, with locations in Cambridge, Massachusetts; Washington, D.C.; Phoenix, Arizona; and Beijing, China.

Consortium for Scenario Planning

The Consortium for Scenario Planning at the Lincoln Institute of Land Policy offers a community of practice for practitioners, including access to technical assistance, educational resources, and a network of fellow innovators. Its mission is to improve the practice of scenario planning and broaden its use in communities of all sizes across disciplines. Through research, peer-topeer learning, networking, training, and technical assistance, we help communities develop better plans to guide a range of actions, from climate change adaptation to transportation investment.

Contributors

This report was developed by APA in partnership with the Lincoln Institute. A special thank you to Heather Sauceda Hannon, AICP, Associate Director of Planning Practice and Scenario Planning, and Ryan Maye Handy, AICP, Policy Analyst, at the Lincoln Institute.

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Methodology

Foresight Methodologies

TREND SCANNING

Researching existing, emerging, and potential future trends (including societal, technological, environmental, economic, and political trends, or STEEP) and related drivers of change.

SIGNAL SENSING

Identifying developments in the far future and in adjacent fields outside of the conventional planning space that might impact planning.

FORECASTING

Estimating future trends.

SENSE-MAKING

Connecting trends and signals to planning to explore how they will impact cities, communities, and the way planners do their work.

Source: PAS QuickNotes 94, "Planning with Foresight."

Trend Timeframes

Identified trends are grouped depending on their urgency:

ACT NOW

Existing trends planners need to act on today.

PREPARE Emerging trends planners need to

prepare for.

LEARN AND WATCH

Potential future trends or signals planners need to learn more about and keep watching.

Five Trend Categories

Five trend categories are at the foundation of APA's foresight research: societal, technological, environmental, economic, and political trends (STEEP). Through these five categories, APA connects emerging trends and potential future trends to planning (sense-making) and creates guidance on how planners can get future-ready (meaning-making).



Trend Scouting Foresight Community

For a successful foresight practice, diversity is key to capture different perspectives, ensure that we identify a variety of trends directly or indirectly connected to planning, and avoid missing trends or signals within or outside the planning world. The members of the Trend Scouting Foresight Community meet quarterly to share observations, discuss present-day shifts they have observed, and hint at signals that could evolve into future trends. The community includes thought leaders from multiple disciplines, industries, backgrounds, career stages, and countries. With our Trend Scouting Foresight Community, we want to imagine futures beyond the views and perspectives within the planning profession, challenging the continuation of our past and present.

APA's Trend Universe

The Trend Universe is the place to find all of the trends that APA has identified as part of its foresight practice. The trends here are dynamically updated, reflecting the accelerating pace of change of today and tomorrow. Here, you can find existing trends (act on them now), emerging trends (start preparing for them), and potential future trends (keep watching and learn more about them) organized around eight general themes.

Transportation and Infrastructure

Emerging trends within the <u>transportation and</u> <u>infrastructure</u> sectors are changing how we get around, how we access critical services, and where we live and work.

Economic Development

Changes in global and local <u>economic develop-</u> <u>ment</u> are altering consumer behavior in communities and influencing how urban systems respond to these shifts.

Technology

Emerging and evolving <u>technology trends</u> are significantly influencing where and how people live, work, and play.

Social Change

<u>Social change</u> is frequently mirrored in the way we plan and structure our communities, as well as in the methods and practices of planning itself.

Climate Change, Energy, and the Environment

The effects of <u>climate change</u>, along with innovations in energy production and grid modernization, are shaping both our built and natural environments.

Work and the Workplace

Rapid changes in the nature of <u>work and work-place</u> environments are influencing how people choose their jobs, commute to work, and spend their leisure time.

Politics and Geopolitical Dynamics

<u>Political and geopolitical trends</u> both influence and are influenced by shifts across the societal landscape.

Housing

Emerging trends in the <u>housing</u> sector point to the critical role that planners will likely play in future decades.

PlanTech and Planning Methods

The world is in constant flux and so is the planning profession. <u>PlanTech</u>, the technologies planners can use in their work to facilitate processes or make certain tasks more efficient, is emerging as a critical element of the future of planning. Emerging methods, such as people-centric and hyperlocal planning approaches to enhance equity, or the integration of futures literacy and imagination into planning, are also rising to meet the challenges of a complex and uncertain future.

The trends we need to act on now

The accelerating pace of change we live in becomes visible when looking at the growing list of trends on which planners need to act now. And while most trends from previous *Trend Reports* are still relevant, many new developments around reoccurring topics require our attention. This includes trends and signals around the latest **artificial intelligence** (AI) innovations, **climate change** and **climate action**, the worsening **housing crisis**, persisting **inequities in transportation**, **political polarization** and related societal division, and the risks of **undervaluing youth** in our communities.

Check out <u>APA's Trend Universe</u> for more trends planners need to act on now.



The AI Era



Rapid developments in machine learning and other AI-driven innovations have the potential to greatly enhance public services, but concerns are increasing about cybersecurity, privacy, and the environmental impacts of supercomputers, like the Aurora supercomputer at Argonne National Laboratory in Illinois. Photo by Argonne National Laboratory.

With the rapid development of machine learning and other innovations driven by artificial intelligence (AI), it's evident that humanity has reached the AI era. The accelerated rise of Generative AI (Gen AI) in the last year has marked a transformative period that has seen an explosion of generated text, images, videos, and voice synthesis. However, there is spreading unease in American society

about AI's profound role and potential implications. As AI's significance burgeons, the U.S. and governments worldwide are working to introduce various regulations, primarily driven by the need to address bias and prevent the potential misuse of AI. While many observers believe that the advancements in Gen AI have the potential to greatly enhance public services, concerns are increasing about cybersecurity and privacy, as well as the environmental impact of the computing power required to support supercomputers.

Generative AI is everywhere

Gen AI, with large language models (LLMs) at its forefront, is the most rapidly expanding AI-driven technology globally. Unlike traditional AI, Gen AI can produce unique content seemingly crafted by humans in <u>six modalities</u>: text, code, audio, image, video, and 3D.

The growth of Gen AI is astonishing. In less than a year, <u>ChatGPT</u> hit <u>100 million</u> weekly users, and over two million developers are actively using the company's API for their projects. In April 2023, an Organization for Economic

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THE FUTURE OF PLANNING

Co-operation and Development (OECD) paper recommended that governments collaborate with stakeholders to ready themselves for a societal and work transformation driven by LLMs. However, as per a July 2023 Pew Research Center survey, many Americans remain unfamiliar with ChatGPT. Only a minority believe AI-enabled chatbots will significantly impact their jobs, and even fewer see them as beneficial to their work. This suggests that 2024 may be a pivotal year in which more people get acquainted with and begin to engage with platforms like ChatGPT and other LLMs in both professional and personal settings. Another growing trend in Gen AI is the emergence of image-generation platforms. Given the integration of DALL-E 3 into ChatGPT 4 and other platforms, a surge in AI-generated visual content is anticipated in the near future.

Gen AI's influence on productivity spans numerous sectors, including planning (see <u>PlanTech</u>). AI is also showing promise in

INSIGHT FROM OUR TREND SCOUTS

"The commodity of the next decade is going to be trust."

—Nico Larco, AIA, Urbanism Next Center, University of Oregon

addressing <u>specific planning chal-</u> <u>lenges</u>, such as parsing professional documents, working with <u>digital</u> <u>twins</u>, or even <u>drafting zoning codes</u> (see also the <u>APA Blog</u> and the APA whitepaper "<u>AI in Planning: Oppor-</u> <u>tunities and Challenges and How to</u> <u>Prepare</u>").

AI innovations are already making waves in education. The initial ban of ChatGPT in major school districts highlighted concerns over the implications of LLMs in the education space. Nonetheless, an increasing number of educators recognize AI's inevitable presence in the classroom. The challenge lies in ensuring its implementation is beneficial. Gen AI can also be a game-changer for individuals with <u>disabilities</u>, offering them tools and solutions to navigate challenges more autonomously.

The upcoming 2024 U.S. presidential elections spotlight the dualedged nature of AI. The technology <u>could revolutionize</u> how political campaigns engage with the electorate. However, the <u>inherent biases</u> within different LLMs, coupled with the proliferation of <u>deepfake tech-</u> <u>nologies</u>, make AI-fueled disinformation a <u>major threat</u> to the integrity of democratic processes and fair elections.

U.S. AI regulations emerge

Driven by concerns about security and potential misuse, an increasing number of local governments are stepping up to craft their own AI regulations and guidelines. With cities pioneering the establishment of rules for AI use, they are effectively becoming trendsetters in this field. For instance, in 2023 <u>Boston</u> and <u>Seattle</u> formulated AI policies that foster AI adoption and responsible use among public servants. New York <u>rolled out</u> landmark regulations overseeing AI-enabled hiring tools and released a <u>plan</u> to embrace AI that launches a process of AI adoption within city agencies.



There's a video out there promoting some dental plan with an AI version of me. I have nothing to do with it.

-Tom Hanks

The proliferation of deepfake technologies make AI-fueled disinformation a major threat in areas ranging from false advertising practices to the integrity of democratic processes. Image by @tomhanks on IG.

At the state level, measures are also intensifying. California's governor issued an executive order placing the state at the cutting edge of AI strategy, emphasizing both proactive AI regulation and the promotion of trustworthy AI practices through state procurement. Meanwhile, Kansas is standardizing Gen AI use across executive agencies, and Texas has inaugurated an advisory body to analyze AI's implications and report to its legislative assembly. The rapid evolution of AI regulations at state and local levels offers public-sector planners a unique chance to harness these emerging policies as guiding frameworks and propose innovative, ethical, and efficient AI applications tailored to urban planning.

The progress of AI regulation at the <u>federal level</u> in the U.S. appears to be accelerating. At the end of October 2023, President Biden issued an <u>executive order</u> focused on ensuring the safe and secure usage of AI. The order aims to safeguard Americans from potential adverse effects of AI-driven technology, building on the previously released Blueprint for the AI Bill of Rights and the voluntary agreement of leading tech companies to follow eight measures from the U.S. government to encourage responsible practices of AI deployment. The AI Bill of Rights proposes measures to establish standards. guidelines, and safety measures for AI, especially in areas related to national security and data privacy. It also highlights the importance of advancing AI research, protecting Americans' privacy, and addressing issues related to algorithmic discrimination. In light of these considerations, public-sector planners will encounter fresh avenues for community involvement and co-creation (see Immersive City for and by the People). At the same time, planners face the challenge of keeping up with new regulations for using AI products, protecting privacy, and reducing the risk of potential discrimination while deploying AI-driven technology solutions.



The progress of AI regulation at the federal level in the U.S. is accelerating, with President Biden issuing an executive order in October 2023 focused on ensuring the safe and secure usage of AI. Photo by Doug Mills/*The New York Times.*

International AI strategies take shape

Countries worldwide <u>are also work-</u> <u>ing to craft</u> AI guidelines. The OECD's recent <u>white paper</u> on Gen AI aims to steer policy decisions and help leaders effectively address the nuances of AI governance. In Europe, a strategic approach towards AI governance is evident. In 2023 the <u>EU reached agreement</u> on the AI Act, a novel legal framework with an emphasis on striking a balance between promoting AI innovation and ensuring ethical AI development and use. The <u>AI Act</u> is emblematic of this vision, striving to establish AI rules without excessively restricting technological progression or inordinately escalating AI deployment costs.

Meanwhile, China has adopted regulations for strict banning of deepfakes (fake versions of images, videos, or audio recordings created by AI) but enforcement is no easy feat in this field. However, this doesn't seem to be dampening enthusiasm for the questionable use of AI tools in the corporate sector. Numerous Chinese firms are continuing to create AI avatars for e-commerce applications and sell mobile apps that potentially can be used to create deepfakes.

Environmental impacts of AI

AI's increasing significance in addressing climate change challenges cannot be denied. Yet, while AI offers <u>solutions to environmental</u> <u>problems</u>, its operation has a substantial environmental footprint. Organizations like the OECD and others are focusing <u>their research</u> on this very topic. Their revelations indicate that the environmental implications of AI computations have largely remained in the shadows until now. Companies working in the AI domain tend to be tightlipped about their energy consumption details, which makes it challenging to obtain a clear picture of the environmental cost. Another recent study finds that generating one image with AI uses almost the same amount of energy as fully charging a smartphone.

It is becoming evident that moving forward, AI corporations need to align with sustainability guidelines. But for these guidelines to be effectively implemented, they need the right tools. The tools presently available to <u>measure the eco-</u> <u>logical impacts</u> of AI computations are not without their flaws, emphasizing the urgency to develop more accurate and holistic methods to ensure the responsible growth of AI without compromising the planet's health.

Looming Climate Impacts and Adaptation Challenges



In an emerging new climate reality, major floods that were previously expected to occur once per century are now blindsiding both landlocked and coastal communities much more frequently. Photo by Ryan Johnson/Flickr.

As global temperatures continue to rise, a wide array of impacts is rapidly emerging. Climate displacement is growing, and evolving strategies for more proactively managing retreat from high-hazard areas are seeing renewed interest from practitioners and communities nationwide. Fears around the role of wildfire—not just as a hazard, but also as a significant source of greenhouse

gas emissions—are also starting to rise, alongside a growing interest in the sources of poor air quality. Ultimately, the dawning reality of climate impacts will require planners to adjust and plan accordingly to avoid catastrophic loss of life, prevent the destruction of property, and protect community well-being.

The new climate reality takes hold

An emerging new climate reality marked by more frequent extreme outcomes is starting to take root across the globe. Flood maps, a critical regulatory and hazard mitigation tool, are becoming outdated in the face of frequent major flood impacts. Major floods that were previously expected to occur once per century are <u>now blindsiding</u> both landlocked and coastal communities much more frequently. For example, Hawaii is <u>increasingly</u> grappling with severe flooding, wildfires, biodiversity loss, extreme heat, and poor air and water quality. During the state's recent deadly wildfires, people were advised to remain indoors in safe locations

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due to high risk of exposure to asbestos and other deadly pollutants that were released into the air from the burning of older buildings. These compounds tainted the water supply, further disrupting the lives of residents and the recovery efforts. Impacts are becoming too severe and frequent for communities to manage on their own. For planners, it will be key to include community knowledge about these new realities and to critically evaluate official hazards documents when making plans for affected communities.

Rising global temperatures

NASA declared 2023 to be the <u>hot-test year</u> on record. July 3rd was the <u>hottest single day</u> since reliable recordkeeping began in 1880, and August saw <u>170 million Americans</u> placed under dangerous heat advisories. Communities are actively working to better characterize the danger posed by <u>extreme heat</u> and to develop strategies and tools for mitigating its impacts. The National League of Cities and U.S. Conference of Mayors are urging Congress to pass <u>proposed bipartisan legis-</u> <u>lation</u> that would explicitly include extreme heat in the federal government's definition of a major disaster.

Some innovations and experimentation are on the horizon. In Spain, Madrid is experimenting with <u>wind gardens</u> to cool down parts of the city by up to 4°C; a coalition of U.S. cities is working to roll out innovative data analysis tools to identify and quickly remedy major heat impacts; and in Switzerland, Lake Geneva is being tapped as a means to actively cool buildings. Given rising global temperatures and impacts at the local level, planners should monitor these innovations, see how they might be useful in their communities, and work to address the critical challenges of urban heat management.

Climate displacement on the rise

The growing impacts of climate change have put more extreme



In 2023, declared by NASA to be the hottest year on record, Phoenix broke 19 heat records and saw 55 days of at least 110 degrees. Photo by Ash Ponders/*The New York Times*.

weather events on a collision course with human settlement patterns. In 2022 alone, nearly <u>33 million people</u> across the globe were displaced due to natural disasters, such as floods, drought, and wildfire. This is far in excess of averages hovering near 20 million people in previous years. This is a growing challenge also in the U.S. More than <u>three million</u> <u>Americans</u> lost their homes to natural disasters in 2022. As climate change continues to worsen, these numbers are expected to grow and even accelerate. By 2050, more than one billion people may be displaced due to climate-related impacts. Adaptation at the local level will be critical to both prepare for the movement of people due to climaterelated impacts and more proactively retreat from especially highrisk areas.

Managed retreat versus continued development

In the face of forced climate displacement, renewed discussion has sought to better characterize managed retreat as a package of potential actions rather than the wholesale abandonment of at-risk areas and the buyout of homes and properties. A June 2023 report from the University of Massachusetts in concert with representatives from coastal communities across the state identified a variety of complementary tools for managed retreat, including enhanced setbacks, deed restrictions, green infrastructure, and an array of zoning and planning actions.

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Yet even as communities begin to understand the potential for these actions in tandem with strategic retreat and buyout programs, continued development in hazardous areas is still the norm. In North Carolina, for example, for every buyout, <u>10 new homes</u> have been built in floodplains. There is a similar dynamic in wildfire-prone areas, as new homes are increasingly being built on the site of previous forest and grassland fires. This is often a result of market and insurance-based incentives that aren't pricing long-term risk into development costs and home prices. Slowly, this dynamic may be starting to shift, given recent actions by insurers in California and Florida to no longer serve homeowners in highrisk areas. This conflict between meeting the need for new development while ensuring that this development is safe from worsening climate impacts is likely to be a major challenge for planners in the coming years.



Due to massive wildfires in Canada, New York and Chicago saw more days with air quality alerts in June and July 2023 than in the past 23 years. Photo by Uygar Özel/Alamy Live News.

Wildfire as a source of greenhouse gas emissions

Wildfires are both a <u>symptom and</u> <u>an amplifier</u> of climate change. This dynamic became a vivid reality in 2023, as <u>Canada's unprecedented</u> wildfires burned thick layers of peat, releasing massive amounts of greenhouse gases into the atmosphere. As temperatures warm in regions like northern Canada, Alaska, and Siberia, the potential for

hotter and more intense wildfires that in turn release more carbon into the atmosphere also increases. Planners should be aware of this dynamic, consult and collaborate with experts, and learn more about emerging monitoring tools that will be critical to adapting to these challenges in the future. Wildfires continue to be a major ongoing threat to the 44 million homes located in wildland-urban interface (WUI) areas across the country, and the catastrophic Maui wildfires in August 2023—among the deadliest in U.S. history—highlights the vulnerability of all communities to the utter devastation that wildfires can inflict.

Declines in air quality

Air quality concerns became a major topic of interest in 2023. The massive wildfires in Canada led to an air quality crisis in cities and communities throughout North America. In June and July alone, New York and Chicago saw more days with air quality alerts than in

the past 23 years of U.S. data.

While this particular crisis has drawn international attention, poor air quality has been a major public health issue for decades, especially in underserved communities. In 2023, NOAA, NASA, and a group of leading universities launched a project to better track the sources of major air pollutants. Private foundations are stepping up their efforts globally. For example, the Bloomberg Philanthropies-led Breathe Cities initiative is seeking to provide critical support, monitoring, and capacity-building tools for communities grappling with air quality challenges. Air quality has been a concern for planning since the beginning of the profession. Planners should continue to engage in efforts to better understand the impacts of the built environment on air quality, and act to reduce the impacts of poor air quality on communities.

The Futures of the (Home) Office

Will the changing workplace and housing availability create a better—or worse—work-life balance? Illustrations by Klaus Kremmerz

Housing crisis worsens and the cost of living increases.



Affordable housing and mental health facilities are plentiful and the cost of living has stabilized.

Climate Mitigation: Skilled Workers, Tech, and Policies



2023's COP28 (Conference of the Parties) in Dubai was the first to hold a Local Climate Action Summit, where mayors and other local government stakeholders from the U.S. and around the world discussed challenges to climate action. Image from COP28 Bloomberg livestream.

The 2023 IPCC Sixth Assessment Report indicates that worldwide warming could reach between 1.4°C and 4.4°C, depending on the extent of emissions produced. It also notes, however, that ongoing mitigation efforts are both slowing the rate of increase of greenhouse gas emissions and becoming more viable within the global energy sector. The 2023 Trend Report discussed emerging developments coming out of the Inflation Reduction Act, which are reflected here and elsewhere in this report. Additional strategies have emerged and matured over the past year.

First ever Local Climate Action Summit at COP28

A positive signal for planners was last year's <u>COP28</u> (Conference of the Parties) in Dubai. It was the first COP where subnational governments and related stakeholders came together during a <u>Local</u> <u>Climate Action Summit</u> (co-hosted by UN Special Envoy on Climate Ambition and Solutions Michael R. Bloomberg) to discuss multilevel climate action. Two main issues were raised: the lack of collaboration between national and local governments to implement national climate commitments and the need for more funding from national governments for local climate action. This development will certainly raise the voice of local governments, and especially the role of planners, on the global climate stage in the coming years.

Increased support for climate workforce development

Mitigating the climate crisis requires the adoption of new technologies and industries, which likewise entails developing a workforce to support this transition. Currently, only one in eight workers globally possesses at least one "green skill"—defined as a skill pertaining to climate and sustainability, such as environmental compliance monitoring or climate risk management—while the number of job postings mandating a green skill is greater than one in five.

To address this discrepancy, in September 2023 the White House announced the <u>American Climate</u> <u>Corps</u>, a job training program with the goal of placing up to 20,000 people in jobs related to climate change mitigation during its first year. Given that <u>many cities</u> are unable to get funding for—or don't even consider—workforce development in their climate action plans, such federal programs provide support that is currently largely unavailable at the local level. This also corresponds with the need for planners to upskill to prepare for new federal policies and programs, especially in the climate and energy sectors.

Uneven progress for renewables

The rapid transition to clean energy remains a dominant topic of conversation in 2024. Investment in solar surpassed investment in oil for the first time in 2023. though global renewable electricity generation still lags behind 2030 Paris Climate Agreement targets. In October of last year, the U.S. Department of Energy announced \$3.46 billion would be put towards updating the U.S. electric grid to better accommodate renewable energy and be more robust in extreme weather. A report from the International Energy Agency identified more than 50 components of the energy system that are critical to reaching net-zero energy emissions, and found that only three



Several U.S. states have made enormous progress in transitioning to renewables, including Iowa, which leads the nation in the share of energy (64 percent) derived from wind. Photo by franckreporter/E+/Getty Images.

areas (solar photovoltaics, electric vehicles, and lighting) were on track to achieve this by 2050.

In the U.S., uneven progress on renewables is also reflected in an array of energy-related challenges (and successes) at the state level. Texas is the <u>national leader</u> in both renewable and nonrenewable energy generation, though the state's energy grid is still notably fragile as highlighted by <u>major outages</u> in 2021 and consumption restrictions in 2022. <u>Recent improvements</u> in

renewable energy storage and generation are credited with bolstering the grid in 2023, even as Texas legislators have aggressively sought to restrict wind, solar, and other renewables. Over the last few years, some states have made enormous progress in transitioning primarily to renewables. In South Dakota, 84 percent of all power generated comes from renewable sources. Iowa leads the nation in the share of energy (64 percent) derived from wind turbines. With new federal investments in battery storage technology (a critical element for incorporating wind and solar into the energy grid), there is significant potential for more consistent and rapid adoption of renewables in planners' jurisdictions across the nation.

Housing Challenges and Solutions



The ongoing housing crisis has made it difficult to provide adequate and safe shelter for an influx of recent refugees and migrants in major U.S. cities like Chicago. Photo by Jamie Kelter Davis/*The New York Times*.

The current U.S. housing crisis encompasses an affordable housing shortage, aging housing stock, and surging homelessness. But new developments in technology and policy innovations seek to address these multifaceted challenges. Notably, APA has partnered with the National League of Cities to launch the <u>Housing Supply Accelerator</u> campaign, aiming to enhance local capacity, identify critical solutions, and expedite reforms that encourage collaboration

between communities and developers to better meet local housing needs and provide a diverse range of quality housing.

The affordable housing crisis is worsening

The U.S. has a current housing deficit of <u>3.9 million units</u>, and the situation is worsening. Developers are anticipating a major <u>drought</u> in affordable housing production by 2025, primarily due to soaring costs and rising interest rates. A looming "production cliff" caused by construction delays and setbacks spells fewer new homes in the market. Adding to the crisis, the average American renter is now considered rent burdened, paying 30 percent of median income for rent. This stark statistic highlights a significant shortage of 7.3 million rental homes affordable to those with extremely low incomes. Furthermore, <u>30 percent</u> of U.S. households today are single-person households—a record high that is placing additional strain on the housing market.

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Meanwhile, the housing construction landscape is evolving, with single-family construction slowing and multifamily construction gaining traction. Urban, suburban, and small-town settings are all experiencing shifts. In urban America, housing availability increased slightly, driven by population loss. However, suburban areas saw a 4.5 percent increase in housing underproduction, and small towns were hit hardest, experiencing a massive 47.8 percent rise in housing underproduction.

These pressing issues demand a focus on expanding the nation's housing stock. Planners play a critical role in devising traditional and innovative strategies to address the affordable housing crisis. These strategies include expanding accessory dwelling unit development, using faith-based organizations' land for affordable housing, practicing gentle density, eliminating parking minimums, and exploring advancements in 3D-printed homes and tiny homes as housing solutions, discussed further below.



Innovative strategies to address the housing crisis include residential development on faith-based organizations' land, such as these affordable housing units built by Washington, D.C.'s Emory United Methodist Church and nonprofit community partners. Photo by Joseph W. Daniels, Jr.

Aging housing stock

The aging U.S. housing stock presents a growing challenge, despite a pandemic <u>remodeling boom</u>. The nation's owner-occupied homes now have a median age of <u>40 years</u>, increasing the need for critical maintenance, renovations, and upgrades. Nearly half of owneroccupied homes were built before 1980 and now face issues such as inadequate water access, rising energy expenses, faulty plumbing, insufficient ventilation, and deteriorating roofs. In 2021, 2.8 million owner-occupied homes (3.4 percent) and 3.9 million renteroccupied homes (8.4 percent) were considered <u>moderately or severely</u> <u>inadequate</u>, while deferred maintenance has led to the abandonment or deterioration of over <u>450,000</u> <u>vacant homes</u> in rural communities. Housing programs, such as proactive inspections and rehabilitation initiatives, encourage timely home improvements, reducing future costs and rejuvenating aging housing stock.

Rising homelessness

Amidst a confluence of factors, including a <u>surge in migration</u>, the winding down of pandemic aid programs, inflation, and soaring housing costs, the U.S witnessed a distressing <u>spike in homelessness</u> from 2022 to 2023. The data paints a troubling picture: an estimated <u>653,100 unhoused individuals</u> in the last year marks a 12 percent increase from 2022, and the situation is poised to worsen.

Many communities nationwide are allocating funds for affordable housing initiatives and amending zoning laws to allow multifamily buildings in residential neighborhoods. Innovative approaches, such as <u>licensed tent villages</u> and <u>tiny</u> <u>homes</u>, are also emerging as viable solutions.

Rising demand amidst influx of immigrants and refugees

The increasing influx of refugees and immigrants has fueled a rising demand for housing, particularly in major U.S. cities. As more people arrive, local governments are confronted with the challenge of handling the situation. This uncertainty has forced cities like Chicago and New York to deploy temporary strategies, but there is a need for permanent housing infrastructure to integrate newcomers. The situation worsens due to NIMBYism, with community members opposing the accommodation of refugees and funding directed toward migrants. This complex scenario underscores the necessity for collaborative efforts across all levels of government to address the housing needs of newcomers in the U.S.

3D-printed housing revolution

As reported in the last two *Trend Reports*, 3D-printed housing solutions are gaining increased prominence. The production of the <u>first two-story</u> 3D-printed houses in Houston and the groundbreaking <u>Genesis Collection</u> community of 3D-printed homes in Georgetown, Texas, demonstrate the accelerating progress in 3D-printing technology for construction.

The <u>materials</u> used to build these structures are as diverse as the applications, ranging from conventional concrete to alternatives like recycled plastic, mud, and waste materials from rice production. As the trend advances, it signifies a transformative moment in construction technology, offering swifter, more cost-effective building methods and holding vast implications for housing accessibility, affordability, and disaster response.

Tiny homes on the rise

<u>Tiny homes</u>—compact living spaces ranging from 100 to 400 square feet—are gaining in popularity. By 2028, the global tiny homes market is projected to reach <u>\$25 million</u>, with a 3.5 percent annual growth

rate. In 2023, Portland, Oregon, established its first mass tiny home site, providing quicker access to apartments for its eventual 200 residents. In California, San Luis Obispo unveiled a tiny home prototype that is slated to introduce 20 tiny homes in the historic area of the city. These tiny homes address housing affordability, sustainability, and minimalist living. While advocates emphasize affordability and environmental friendliness, skeptics urge caution against hasty adoption without studying potential land use impacts. Their role in addressing the housing crisis and homelessness is still up for debate, with many city and county land use regulations complicating or prohibiting the legal development and occupation of tiny homes and micro apartments.

Expanding government initiatives to address the housing crisis

Local, state, and federal government-led policy initiatives and



Portland has established seven villages filled with small pre-fab tiny houses as a form of transitional housing. The city opened its first mass tiny home site in August, designed to provide access to 200 residents. Photo courtesy of City of Portland/KLik Concepts.

funding for housing are proliferating as a response to the country's housing challenges. At the local level, <u>New York City</u> has proposed a plan to create an additional 100,000 homes over 15 years, offering significant support for the city's residents and workforce, while <u>Los Angeles</u> has approved plans for an additional 135,000 units in the downtown and Hollywood areas. In <u>Hawaii</u>, an executive order suspending certain laws is facilitating the construction of thousands of new homes for residents of all income levels. Meanwhile, the Governor of <u>California</u> signed a bill designed to expedite affordable housing projects, with <u>other states</u>, including Delaware, Utah, Arizona, and Rhode Island, also <u>taking action</u> to address the housing crisis. But environmental groups have opposed some state and local government actions, including California's <u>Senate Bill 406</u>, designed to streamline the California Environmental Quality Act for affordable housing, and <u>Minneapolis</u>' comprehensive plan to enhance affordable housing production.

At the federal level, the Biden administration introduced new housing crisis measures, including \$85 million in grant funding. These initiatives focus on reforming zoning and land use, reducing barriers, expanding financing for energyefficient and resilient housing, and promoting commercial-to-residential conversions for affordable and zero-emissions housing. Fair housing planning and enforcement are also gaining attention, with the U.S. Department of Housing and Urban Development proposing a new Affirmatively Furthering Fair Housing rule in 2023 to fulfill the requirements of the Fair Housing Act of 1968. These actions reflect a commitment to combat housing discrimination and proactively promote inclusive communities.

Deep Dive: The Silent Health Crisis

The world is grappling with an ongoing "silent" health crisis that demands a comprehensive perspective. This crisis arises from a myriad of challenges, as global public health faces mounting pressures while health care systems worldwide struggle to meet ever-growing demands. The COVID-19 pandemic exacerbated these issues and shined a spotlight on the critical issue of mental health.

SYMPTOMS OF THE CRISIS. One of the key aspects of this silent crisis is the "panic-neglect" cycle. Levels of concern and preparedness surge during the peak of a crisis (like COVID-19), but as the crisis recedes from the forefront, complacency sets in. This cycle, coupled with emerging health stressors tied to climate change and biodiversity loss, can leave health care systems ill-equipped to handle future global health threats.

The largest sustained decline in global childhood vaccinations in 30 years has been characterized by UNICEF as a "<u>red alert</u>" for child

health. Additionally, the concerning rise of antimicrobial resistance, exacerbated by the overuse and misuse of antibiotics, antiseptics, and antifungals, poses an independent and significant threat to alobal health and further increases the challenges faced by the health care system. Another significant challenge is the severe shortage of health care professionals. While this issue was brought into sharp focus during the COVID-19 pandemic, it was already a growing concern. The World Health Organization predicts a global shortage of 10 million health workers by 2030.



In response to the growing mental health crisis, the U.S. Surgeon General has prioritized combating loneliness with a framework that highlights the importance of the built environment in fostering social connection. Photo by FG Trade/E+/Getty Images.

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Compounding these challenges is the growing mental health crisis. Statistics reveal that one in five U.S. adults experiences mental illness each vear, and suicide ranks as the second leading cause of death among those aged 10-14 and 20-34. A recent study underscores this crisis, showing an almost 40 percent increase in the use of mental health services among U.S. adults from 2019 to 2022. Exacerbating factors include violence, poverty, isolation, and loneliness. Significantly, the U.S. Surgeon General has prioritized combating loneliness. His proposed framework highlights the importance of the built environment in fostering social connection, emphasizing the role of planning. U.S. mayors are increasingly recognizing the need to prioritize mental health alongside physical well-being, and planners play a pivotal role.

However, even as health challenges continue to mount, there's a troubling trend: people are caring less about them. The <u>Global</u> <u>Risks Perception Survey</u> by the World Economic Forum reveals that



Barcelona's *superilles* (superblocks) concept, which focuses on pedestrian-friendly areas and green spaces, serves as a prime example of innovative planning solutions promoting health. Photo by Del Rio Bani/Leku Studio.

health-related risks are no longer perceived as top priorities compared to other global concerns. This shift may be attributed to "pandemic fatigue," as well as our focus on more recent and visible crises. For example, while COVID-19 has claimed around <u>seven million</u> <u>lives</u> worldwide over four years,

air pollution was estimated to be responsible for around <u>nine million</u> <u>deaths</u> in 2019 alone. Even though more people are impacted by air pollution, they often don't perceive it to be as threatening as COVID-19 because it's not portrayed as a crisis in the media, and its impact isn't as visible. But it's crucial to recognize that silent crises with cumulative impacts can far surpass the impact of one-off catastrophic events. They should not be neglected, and concerted efforts are needed to address them.

SEEKING SOLUTIONS. To address these multifaceted issues, communities must adopt a holistic view of health within larger systems. We know that promoting public health is not solely the domain of the health care sector. Planners play an integral role in fostering well-being and healthy lifestyles by providing access to vital components such as healthy food, clean air, places to be physically active, secure housing, and opportunities for social cohesion. Planners should recognize the importance of their partnerships with public health and health care professionals in improving community health. This is exemplified by recent approaches like "social prescriptions" for mental and physical well-being, in which doctors recommend activities such as park walks to address health challenges.

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Planners are instrumental in creating environments that enable these health-enhancing activities, demonstrating their crucial role in these partnerships.

Cities such as Barcelona are leading the way in adopting innovative solutions. Barcelona's <u>superilles</u> (superblocks) concept, which focuses on pedestrian-friendly areas and green spaces, serves as a prime example in promoting health. Other cities, including Los Angeles, are taking inspiration from Barcelona's success and implementing similar concepts in their urban areas. In addition to tactics like these, planners should also explore new practices such as "trauma-informed" planning, which infuses trauma-informed principles into planning practices to enhance resilience and reduce stressors that impact mental well-being.

Moreover, technological advances present opportunities to bolster health care. Like other sectors, health care can harness technology to augment capacity and blend virtual and in-person



Technological advances present opportunities to bolster health care, as innovations in virtual reality and immersive technologies are already offering valuable tools for addressing trauma and mental health concerns. Photo by jxfzsy/E+/Getty Images.

care, reducing costs. Innovations in the realm of virtual reality and immersive technologies are already offering valuable tools for addressing trauma and mental health concerns. Ukrainian refugees, for instance, are finding solace and support by working through their trauma within a <u>metaverse version</u>. of Kyiv. These technologies extend to therapeutic applications such as pain management and mental health treatment, while the concept of <u>"biophilia" in the vir-</u> <u>tual realm</u> provides nature-based benefits through VR. <u>AI chatbots</u> are also emerging as potential companions, although the risk of deepening social isolation warrants consideration.

Health systems innovation, particularly in care delivery, staffing, and funding models, is needed to improve access and provide bettter disease prevention, early detection, and complex care in a cost-effective manner. This transformation is particularly critical as we anticipate an aging and increasingly frail population with chronic health conditions. By embracing these innovations, we can better meet the health care needs of our evolving society.

As we look toward the future, governments and businesses are faced with the imperative of adding a health dimension to their <u>emer-</u> <u>gency preparedness plans</u>. This adjustment is crucial for ensuring that we are well-equipped to confront the silent health crisis that is coming our way. Planners play a pivotal role as partners, fostering well-being, crafting health-enhancing environments, and collaborating with health care professionals to address multifaceted health challenges.

Political Polarization and Societal Division



Increased antigovernment sentiment is leading to rising hostility and declining civility in public meetings, prompting stricter rules to protect public officials and local government staff. Photo by Robin Loznak/*The News-Review*/AP Photo.

2023 saw continued developments in societal and political polarization, both in the U.S. and globally. The steady corrosive effects of conspiracy theories on public discourse intersected directly with the world of planning, as widely accepted concepts such as 15-minute cities or smart cities became the subject of online and in-person fearmongering. Increases in antigovernment sentiment

and rising instances of politically motivated violence further contributed to an atmosphere of mistrust and associated safety fears for many public officials. States wielded their power to clamp down on both speech and progressive policies at the local level, leading to concerns around politically motivated preemption. As polarization becomes entrenched within government and society, planners are struggling to find a path forward.

Antigovernment sentiment and increased violence

The mainstreaming of conspiracy theories, along with the widespread reach of an array of social media platforms, are leading to increases in antigovernment sentiment, radicalization, and in extreme cases, <u>violence against public officials</u>. In 2023, trust in government neared record lows, as <u>only 16 percent</u> of Americans expressed confidence in the federal government to do what is right all or most of the time. Planners are often the face of local government in public settings, and are increasingly noting rises in hostility, declines in civility, and outright threats to their safety. This is leading to stricter rules around <u>public</u> <u>comment periods</u>, which could have an impact on planner-led community meetings.

Declining social cohesion and societal polarization

The ongoing polarization of society is a major contributor to antigovernment sentiment, the growth of conspiracy theories among the wider population (some directly related to planning), and increasing threats of violence. According to the World Economic Forum, "erosion of social cohesion" is one of the biggest short-term global risks. These declines are linked to an array of different social, political, and economic causes. COVID-19-related disruptions and major economic shocks such as inflation have been identified as proximate causes in some countries. Underlying challenges such as rapid technological change, widening wealth gaps

INSIGHT FROM OUR TREND SCOUTS

"The rise of antigovernment sentiment in the public has led to an increase in protests during public meetings, often marked by a loss of civility. Simultaneously, the concept of transparency faces challenges, as many people now expect to be provided with an exhaustive level of detail on every issue."

-Keith Marvin, AICP, APA STaR

between the richest and poorest, and the decline of the middle class are impacting the fabric of communities, the civic process, civil engagement, and social interaction. Highlighting the extreme effects of polarization, topics of major national and international importance (such as <u>climate change</u>) are actively avoided within certain segments of the political spectrum. For planners, increasing polarization and declines in social cohesion are a major challenge, particularly given the outsized role that planners play in public engagement, consensus building, and building broadbased community support for local actions.

State preemption of local progressive actions

Aggressive preemption bills in state legislatures continue to constrain local governments' abilities to regulate areas of concern, as first reported in the 2022 Trend **Report**. In Texas, state legislators, through a largely unprecedented new state law, successfully stripped the ability of cities and communities to create local laws that are more restrictive than the state's. This is already impacting workers' rights, as local legislation concerning water breaks for outdoor workers has been overridden and banned by the state. Given the expansive and broad nature of the legislation, it is likely that issues directly related

to planning, such as zoning and development review, may also be under threat. Many regulatory areas already <u>preempted by states</u> intersect either directly or indirectly with planning concerns, including inclusionary zoning, the regulation of short-term rentals, rent control, and rideshare regulations.

Persisting Transportation Inequities



A more equitable approach to transportation planning, like the Vision Zero efforts undertaken by Jersey City, New Jersey, can not only increase mobility options but also decrease pedestrian and bicyclist fatalities. Photo courtesy of City of Jersey City.

Local governments and planners are overwhelmed with the myriad emerging transportation systems that are popping up. While previous *Trend Reports* have focused on the many innovations in the transportation sector, this year we want to emphasize how current practices in how cities respond to these new systems create more inequities and are harming community members. Today's more diverse transportation systems need a different approach to transportation planning.

Inequitable transportation planning practices favoring the car

Many transportation sector innovations provide new alternatives to the car that are more sustainable, safer, healthier, and potentially easier to deploy in equitable ways. However, the myriad new transportation systems entering the market have overwhelmed some cities, leading to pushback. For example, in 2023, Paris banned shared e-scooter programs, <u>stating safety concerns</u> as the main reason. Meanwhile, over 2,000 people <u>die in car acci-</u> <u>dents</u> every year in France, and cars remain on the streets.

In the U.S., inequitable, car-centric transportation planning practices continue to support the transportation system that uses up most of the space in our cities, pollutes the air we breathe, and kills thousands of people every year. In 2022, the <u>U.S. Highway Trust Fund</u>, which is primarily supported by federal taxes on gas, spent \$52 billion on highways and only \$7.2 billion on transit. Improvements in fuel efficiency and the transition to electric mobility will require a rethinking of this funding source, which still focuses mainly on how to finance infrastructure for cars.

However, the demand for alternative transportation systems such as <u>e-bikes</u> has been increasing in the U.S. over the last few years, and the popularity of <u>bike-share programs</u> and the market for cargo bikes also continue to grow. However, the rising numbers of traffic deaths and decreasing traffic safety, as well as the lack of appropriate and safe infrastructure for these emerging transportation systems, show how inequitable current transportation planning is. Planners must continue to design and advocate for safer streets for all users.

INSIGHT FROM OUR TREND SCOUTS

"Cargo bikes and e-bikes are convenient in areas with well-established bike lanes, but fostering a cultural shift is essential in regions lacking the necessary infrastructure. The need for adequate biking infrastructure transcends mere convenience—it's fundamentally an equity issue."

-Norman Wright, AICP, Parameter

Decreasing traffic safety but only in the U.S.

Among industrialized nations, the U.S. is one of the <u>deadliest</u> for pedestrians. Pedestrian deaths went up by <u>77 percent</u> from 2010 to 2021 in the U.S., while in most other industrialized countries they have gone down. In 2022, 7,500 pedestrians were killed in traffic accidents, a 41-year high. People of color are disproportionately affected by this trend. And in 2021, almost 1,000 bicyclists died in motor vehicle crashes, a five percent increase from 2020. While Vision Zero gains more attention in the U.S., with good examples such as Jersey City,

New Jersey, which achieved its goal of zero traffic deaths on city streets in 2022, more still needs to be done. Planners can push for improvements at a range of scales, from long-term transportation plans and <u>Complete Streets policies</u> to <u>quick-</u> <u>build</u> tactical urbanism installations and demonstration projects.

A global trend toward car-free cities

Globally, cities are trying to minimize car traffic or to remove cars from certain areas completely. Research shows that car-free environments result in healthier people, thriving local economies where people can shop in walkable places, reduced greenhouse gas emissions, and better environmental outcomes. The latest such example is <u>Stock-</u> <u>holm</u>, where starting in 2025 all diesel or gas-powered vehicles will be prohibited from entering certain areas of the city.

Some U.S. cities are moving in these directions, looking at Europe for new ideas. For example, Los Angeles is piloting Barcelona's *superilles* (superblocks) concept (see also Deep Dive: The Silent Health Crisis), and the new car-free Culdesac communities in Atlanta and Tempe, Arizona, offer residents enhanced shared mobility and transit options. Planners can begin conversations with community members about parts of their cities where cars might or might not be appropriate and what alternative development patterns and mobility options might look like in those areas.

Eliminating parking minimums

Eliminating parking minimums is another way to reduce the number of cars. It also lowers the cost of building new housing, which is urgently needed given the persistent housing crisis (see Housing Challenges and Solutions). This movement has been trending in the U.S. for several years; according to the Parking Reform Network, more than 1,400 cities have eliminated parking requirements in some portion of their cities, with at least 40 abolishing or reducing parking requirements citywide. Examples include San Jose, the biggest city to approve the removal of parking minimum requirements, and Austin, Texas, which in 2023 passed a resolution to remove all mandatory parking requirements for new developments. Planners should continue to evaluate parking requirements in their communities and work on right-sizing or eliminating parking minimums as appropriate.

Vehicle charges based on different evils

Some cities are adopting new charges based on different negative impacts of cars. In the UK, London and other cities and towns have started to enforce emission-based parking charges to tackle traffic-related air pollution. A similar idea has been put in place in Lyon, France, where parking charges increase with the weight of the car to discourage larger cars (which are usually more polluting, need more space for parking, and cause deadlier accidents) from entering the city. In the U.S., bills related to fees based on vehicle weight have been discussed in California and Colorado. New York City will use congestion pricing to reduce traffic and related pollution in Manhattan and to fund its public transit system. Planners should watch to see how these examples will develop and how concerns related to inequitable practices can be resolved.

The uncertain future of public transit

Most U.S. public transit systems are still struggling post-COVID-19. With commutes declining due to working from home or hybrid work, revenue from transit fares has not come back to pre-pandemic levels. More funding from the federal government is needed to improve the quality and safety of public transit and to adapt existing infrastructure systems to new climate realities, such as extreme heat. Across the globe, from India to Norway to New York, transit agencies are trying to get people back to using transit by making it free for all or for specific population groups. But to increase ridership, transit agencies will need to improve the quality of their services and systems, not just maintain the status quo.

Electric mobility is only a part of the solution

While e-mobility is a part of the solution when it comes to

INSIGHT FROM OUR TREND SCOUTS

"Across the nation, communities are ending parking minimum regulations, which will gradually reduce the allocation of space for automobile parking. In already developed areas, this newfound space will be an opportunity to improve urban life by repurposing it for other purposes."

-Jim Olson, P.E., Better Roads Ahead

decarbonizing transportation (see the 2023 Trend Report), it also comes with many negative effects that continue to raise concerns. Even Norway, the country with the highest rate of EV ownership, is taking a step back as the transition to e-mobility has resulted in increased car ownership and multiple equity concerns. With nearly 72 percent of public EV chargers situated in the wealthiest 20 percent of counties in the U.S., equity concerns are already visible. Simply replacing gas-fueled cars with EVs is not a sustainable solution. In addition to

the global dynamics around natural resources needed for these technologies, questions such as the need for battery recycling are still not resolved, though innovations and potential solutions are being proposed. Recent reports about hackers targeting EV chargers raise concerns about cybersecurity, especially in the light of personal data that is being shared with EVs. Safety is also a question, as the heavier weights of EVs make crashes more deadly and put extra stress on roadways and parking garages. Planners and local governments must look beyond EVs and embrace the wide

variety of alternative transportation options available today (as mentioned above) and in the future (see <u>Emerging Forms of Transportation</u>).

MaaS

Assigning space by means of transportation instead of purpose isn't working anymore. As first reported in the 2022 Trend Report, the concept of Mobility as a Service (MaaS)—the integration of various forms of transport and transport-related services into a single, comprehensive, and on-demand mobility service—can change the way people move. MaaS is already deployed in many places across the globe. The global MaaS market was estimated at about \$236 billion in 2022 and is projected to grow to about \$775 billion by 2029. A holistic, comprehensive approach toward equitable transportation planning and funding is needed. MaaS can potentially help to identify the needs and target the current gaps in our transportation systems.

The Value of Youth



In Montana, youth plaintiffs sued the state government for its failure to include climate change considerations when approving fossil fuel projects—and won. Photo by Janie Osborne/*The New York Times*.

The <u>2023 Trend Report</u> outlined the risks of youth disillusionment and disengagement based on issues such as climate change, technology use, and meaningful actions related to equity, diversity, and inclusion (EDI). Gen Z and Gen Alpha know that the current failure to act on climate change will result in even worse impacts on their future and their children's futures. Additionally, they grow up surrounded by technology; they know how to

use it, and they want to use it. Last, but certainly not least, younger generations are expecting meaningful action when it comes to EDI, having new and redefined perspectives on what personal identities may look like and how far they can go. Change is not always easy, even for planners who are the change agents of our communities. Young people are starting to question the status quo and want to change it. Planners should encourage and support these efforts.

Youth climate action

In the U.S. and elsewhere, youth are taking action, and in many cases successfully. In last year's *Trend Report* we reported on a landmark lawsuit filed by young people against the government of Ontario based on its weak climate targets. This year, a similar story ended successfully in Montana, where youth sued the state government for its failure to include climate change considerations when approving fossil fuel projects. The judge ruled that this was unconstitutional and that everyone has a right to a healthy environment, which is why the state will have to consider climate action in projects moving forward.

Decolonizing the future

While EDI has become a priority in planning and many other professions, and topics such as racial equity, gender responsiveness, our aging population, and planning for all abilities have gained a lot of attention, planning with youth and younger generations is only slowly making it into the mix. Different professions and organizations have started to emphasize the importance of <u>youth engagement</u> when thinking of or planning for the future (e.g., UNESCO's Futures Literacy in Higher Education initiative). A trend toward challenging the conventional tech-centric and white-dominated way of deciding what the future will or should

look like is emerging, emphasizing the idea of <u>decolonizing the future</u> by including the ones who will live in it—today's younger generations. Engaging youth can empower them and give them the opportunity to make change happen.

The importance of including younger generations in planning processes has been recognized and is gaining more attention as well. C40 has entered the third round of its Students Reinventing Cities program, harnessing the creativity of young people in different cities to reinvent their futures. And in the U.S., Detroit won a 2023 APA National Planning Award for its innovative way of engaging youth and fostering their collaboration with community leaders. It is now the first major U.S. city to complete a comprehensive neighborhood plan backed with investments that puts youth at the center of planning and decision-making. Including young people in planning processes can also result in more interest in the planning profession and a more robust pipeline of future planners.

Location sharing for safety and well-being

Digital solutions to challenges in the built environment are becoming part of everyday life, especially for younger generations who grow up with technology as an integral part of their lives. Younger generations are now applying digital technologies to resolve some of their challenges, such as safety concerns, anxieties, and the need to connect with friends. How effective these solutions are and whether they may cause additional negative impacts on mental health remain to be seen.

While privacy has become a concern in a world of constant online presence and social media, younger generations value the option to <u>share their location</u> to resolve safety issues. Downloads of the tracking app <u>Life360</u> have doubled since 2021, with over 33 million monthly active U.S. users; the tag <u>#findmyfriends</u> has over 50 million views on TikTok; and Snapchat allows for real-time user location tracking through its <u>Snap Map</u>.

INSIGHT FROM OUR TREND SCOUTS

"The first young generation of professional urban planners in Mexico is thinking about their legacy and how to change the status quo."

> —Rodrigo Junco Lopez, Technologico de Monterrey

But while location tracking may be an attractive digital solution for young people and the challenges they face in our communities, it also poses risks, such as providing opportunities for stalkers and other bad actors. As mentioned in <u>Deep</u> <u>Dive: Planning for a Hybrid World</u>, planners will have to consider digital solutions—both their possibilities and their perils—when planning for the real world. The information coming from these apps, as well as data from open-source applications such as <u>SafetiPin</u>, can provide important inputs into planning processes and assessments of what younger people need, helping planners understand the "why" behind these trends.

Aging populations and declining birthrates

According to projections from several national and international organizations, global population growth will slow over the next few decades, reach its peak in the next 40 to 60 years, and potentially decline after that. In some countries, this is already happening: China recorded negative population growth in 2022, and U.S. birthrates have been declining for decades. In 2021, the Pew Research Center found that 44 percent of childless adults between the ages of 18 and 49 (up from 37 percent from 2018) say they will not likely have children, citing economic and social pressures as primary reasons.

The aging population will add growing pressure on health care and other social security services, such

as pensions and retirement systems. Meanwhile, young people want to enter tech and related emerging fields despite a growing need for geriatric specialists and in-home health aides; declining numbers of vouth will further exacerbate this shortage. Furthermore, an aging population will consume fewer goods and services, potentially slowing the economy, reducing the tax base, and shrinking budgets for public investment. On the other hand, these trends could lead to positive climate and environmental impacts and more affordable housing availability.

Additionally, increased interest in and funding for fertility research (including topics such as <u>artificial</u> <u>wombs</u> and other ways to bypass the need for pregnancy) and lifeextending measures will most likely gain more attention and support in this context. Perhaps it will also result in a different perspective on the value of youth of today and the promise they hold to improve our tomorrow.

A World With Less Water



Illustration by Christian Blaze

From a circular economy to "fit for purpose," a holistic approach is needed.

By Chi Ho Sham, PhD Chi Ho Sham, PhD, was the 140th President of the <u>American Water</u> <u>Works Association</u> (AWWA). He currently serves as the Chair of the New England Section of AWWA, a Trustee of the AWWA International Council, and the Chair of the AWWA Stormwater Management Standard Committee.

How should the scarcity of water resources influence urban development strategies in the U.S.? Is it feasible to adapt to living with less water?

Water scarcity can be caused by nature and/or humans. With increasing populations, demands on water resources, and climate variability, we are encountering water scarcity at higher frequency and magnitude. Over the past several decades, the promotion of water conservation and efficiency has lowered per capita consumption of water in urban areas of the developed world. However, there are unintended consequences associated with living with less water. For example, most existing wastewater collection systems were designed to rely on gravity and wastewater flow volume to move waste to treatment plants. Failure to move wastes effectively can lead to collection system failures. In other words, urban development strategies must consider the modified urban water cycle when planning new infrastructure.

There are many different strategies to tackle water scarcity, which include the development and implementation of a circular economy of water. Instead of taking water from the environment,

treating it for use, treating it again after use, and then releasing the treated water back into the environment, we will need to redesign our urban hydrologic cycle to reduce, recover, reclaim, reuse, and recycle our water resources. It is important to extract as much value as we can from our finite water resources by maximizing the usefulness of the resource. Urban development strategies will therefore need to incorporate rainwater harvesting, prevent toxic chemical releases, advance nonpotable and potable water reuses, and recover other resources (such as energy and materials). Moreover, planning must extend beyond the urban boundaries to other communities to preserve natural water bodies, manage watersheds in a holistic manner, and protect natural infrastructure (e.g., forests).

We should also consider the "fit for purpose" approach, that is,

ACT NOW

deliver water of different quality levels appropriate for different uses (e.g., doing laundry, watering plants, and drinking). Such changes would involve deploying new infrastructure and monitoring systems of the future through thoughtful planning processes.

What responsibilities do urban planners and planning practices have in addressing the emerging water crisis?

For quantity, it has to do with too much or too little (i.e., floods or droughts). For quality, we are dealing with biological and chemical contamination. Land and water are intricately linked. To develop a piece of land in an urban setting, water is required to support the people and related economic activities. Working with water planners and managers, urban and regional planners can adopt an integrated approach to water management through land use regulations, infrastructure development, land conservation and watershed protection, and education of the

INSIGHT FROM OUR EXPERT

"Instead of taking water from the environment, treating it for use, treating it again after use, and then releasing the treated water back into the environment, we will need to redesign our urban hydrologic cycle to reduce, recover, reclaim, reuse, and recycle our water resources."

public and decision-makers to address various water crises. Collaboration with other professional organizationse.g., AWWA, AWRA, NALMS, and WEF—can provide platforms for interdisciplinary collaborations to solve complex problems at the individual, community, and organization levels. For example, the protection of drinking water supply sources such as lakes, reservoirs, streams, and aquifers relies on protecting the land contributing water to the water sources. Land use management practices can help to reduce stormwater runoff. increase groundwater recharge, and minimize releases of biological and chemical contaminants.

Planners and other professionals working together and deploying a variety of suitable tools would contribute to mitigating water crises in the future.

The trends we need to prepare for

We are headed towards a **polycrisis** based on current **global dynamics** related to **climate change**, scarcity of **resources, economic warfare**, and a **food crisis**, among other challenges. In addition, a myriad of **technological innovations** in the transportation, production, and other sectors are being developed, some with the promise to resolve current challenges. Many of these developments are starting to impact communities at the local level and planners need to prepare for them.

Check out <u>APA's Trend Universe</u> for more emerging trends planners need to prepare for.



Global Dynamics and a New Economic Landscape



A resurgence in U.S. manufacturing is changing the economics of many communities through new investments in factory construction, such as Hyundai's first U.S. plant for manufacturing electric vehicles in Ellabell, Georgia. Photo by Russ Bynum/AP Photo.

Economic transformation is changing the way we live and work, leaving a profound impact on industries and regions across the globe. The trends below collectively underscore the intricate connections between economic shifts and technological development and the clear interdependence between global dynamics and local impacts. They signify a fundamental reshaping of industries and economic landscapes on both national and international scales.

Increased deglobalization and economic warfare

Globalization increased after WWII, accelerating to hyperglobalization in the 1990s and 2000s. The financial crisis in 2008 <u>slowed</u> this trend, and recent events are causing a <u>shift towards deglobal-</u> <u>ization</u>. Supply chain disruptions during the COVID-19 pandemic resulted in increased onshoring (domestic outsourcing instead of offshoring) activities. In addition, the Russian-Ukrainian war, ideological differences between governments, and differing sustainability approaches are spurring the trend toward rethinking external dependencies, redefining trusted partners, and reframing what resilience looks like.

Geopolitical goals are becoming an <u>increasingly deciding factor</u> in economic policy and international trade. Desires for self-sufficiency and independence from rival powers are resulting in an increase in friendshoring and onshoring, supported by subsidies, policy, visa bans, and even exclusion of

companies from specific markets. This includes U.S. bans on new investments in high-tech China-based industries. U.S. companies are reducing their investments in China and actively seeking alternative manufacturing locations like India, Vietnam, Malaysia, and Bangladesh, with Mexico surpassing China in foreign direct investment by U.S. firms. Meanwhile, China is experiencing worker shortages due to evolving preferences of its young workforce, who are choosing alternative career paths that are less demanding.

The U.S. Inflation Reduction Act's tax credits and subsidies for local green technologies are raising concerns in Europe, which is also launching an anti-subsidy investigation into <u>electric vehicles from</u> <u>China</u> that are flooding the market. And inbound or outbound investment screening practices are being considered in the U.S., Switzerland,
and other places. Arkansas recently passed legislation to ban foreign companies from owning agricultural land to protect this vital economic sector and its farmers.

Reshoring manufacturing jobs

All these developments align with the current push toward the return of U.S. manufacturing, supported by new federal incentives to promote domestic manufacturing of components such as computer chips and electric vehicle parts. The manufacturing sector has added nearly 800,000 jobs since early 2021, reaching employment levels not seen since 2008 and exceeding the peak of the previous business cycle for the first time since the late 1970s. But workforce challenges persist: as of March 2023, there were still 693,000 open positions in this sector, and experts think there may be around 2.1 million unfilled manufacturing jobs by 2030.

Planning and infrastructure development are significantly

influenced by this manufacturing resurgence, which is being led by the transportation equipment and food manufacturing sectors. Land use and zoning adjustments will be needed to accommodate the construction of <u>new facilities</u> being built in locations ranging from deserts to resort towns. The influx of manufacturing jobs is also driving housing demands, shaping the housing landscape in areas experiencing manufacturing growth.

Tech Hubs

The Biden administration's <u>Tech</u> <u>Hubs</u> initiative aims to transform <u>31 regions</u> into globally competitive innovation centers, addressing regional disparities and promoting technology-driven economic growth in traditionally industrial regions. The <u>\$500 million</u> investment seeks to turn both urban and rural U.S. metro areas into tech innovation hotspots focusing on industries such as quantum computing, biotechnology, and clean energy, with regions like Central Ohio already making strides. Major investments from companies like Google and ongoing construction of semiconductor facilities signal the transformation of these areas into thriving technology centers, stimulating innovation and job creation.

Global collaboration and local solutions in the energy sector

The energy sector is showing movements toward both globalization and deglobalization. The green transition in the energy sector is making local energy generation through renewable sources more popular. Estimates by the International Energy Agency predict a massive decrease of the market share of the global oil market compared to other domestic energy sources. Global collaboration will still be needed for other resources powering the electrification of everything, however (see the 2023 Trend <u>*Report*</u>). But while climate change policies need global cooperation,

the implementation of sustainable energy systems requires a local focus.

Smart city tech in times of economic warfare

Urban technologies have reached the status of geopolitical tools and strategic assets and, much like traditional resources, they are now at the forefront of international disputes and power plays. The escalating clash between the U.S. and China further underlines these geopolitical tech dimensions. The "Smart Cities" idea often associated with Western models of urban development and the "Safe Cities" concept championed by China (aimed at enhancing public safety through surveillance technologies, among others) are more than just technological frameworks. They represent strategic narratives, equally prevalent in both technical-cultural arenas and emerging markets. These concepts demonstrate the broader competition in the realm of technology and its role in shaping the future of

urban spaces globally.

Related to the current global tensions, the federal government, more than half of state governments, and even some cities have recently taken action to forbid the use of TikTok on government devices due to the relationship between TikTok's parent company ByteDance and the Chinese government. However, some states are seeking to go further. Montana has passed legislation banning the use of TikTok on personal devices, starting in 2024. This far-reaching action has drawn criticism from free-speech advocates, who argue that the legislation is a clear violation of the First Amendment. Many are skeptical that the law will actually take effect, especially as a federal judge preliminarily blocked the law in November 2023. As planners seek to engage with the public in new and innovative ways, especially through the use of popular social media applications and platforms, such restrictions could be a major concern and potential hindrance to effective outreach.

Immersive City for and by the People



New technologies allow community members to co-create with planners, as demonstrated by these multiple reimaginings of an urban area in Tokyo, created with Generative AI. Photos courtesy of Urbanist AI.

Urban spaces are expanding beyond just physical realms due to AI-powered digital twins and the metaverse, offering new ways for community members to engage with cities and influence decisions. Urban AI holds immense potential for future city development. AI-centric smart city platforms are forecasted to grow from \$693 million now to \$6.5 billion by 2032. Additionally, the global smart city tech market is <u>set to</u> <u>rise</u> from \$121.1 billion in 2023 to \$301.2 billion by 2032.

However, this progress brings challenges, including threats to inclusivity and equal access due to the <u>digital divide</u>. It's crucial to consider how planners can ensure human rights are upheld in this digital era.

From participation to co-creation

Urban dwellers are increasingly embracing do-it-yourself methods and self-organization. A trend toward <u>co-creation</u> is emerging as a collaborative approach in which planners and end users jointly develop solutions. This process emphasizes deep user engagement facilitated by new technologies. Consequently, there's growing skepticism towards traditional experts and a surge in the creator economy. Communities are becoming more proactive, self-regulated, and interconnected. Start-ups like <u>UrbanistAI</u>, leveraging advanced AI capabilities, are empowering users to step into the role of "citizen planners," allowing them to actively co-design their surroundings. While this makes the planning process more complex and less predictable, it also ensures a more inclusive approach.

Such technology-driven selforganization and co-creation could significantly reshape the future of the planning profession and its approaches. Crowdsourcing offers a novel means to engage a broader audience in the planning process and to gather data more efficiently and accessibly. For instance, the Japan-based start-up Tekkon turned infrastructure data collection into a game. By selling this data to utility companies, they aim to reduce maintenance costs and increase efficiency. Similarly, in the realms of mobility and air quality, the European project WeCount empowers residents to kickstart policymaking initiatives using fully automated data measurements. Planners can recognize and adapt to this trend instead of relying on their established expertise. With the aid of AI and other

advanced digital tools, they can allocate more time to collaborate with their communities on envisioning a preferred future.

Quiet metaversing

The metaverse, another tool offering a deeper level of engagement, is far from obsolete, contrary to what some might believe. As highlighted in the 2022 and 2023 Trend *<u>Reports</u>*, while the metaverse's initial hype cycle peaked in the beginning of 2023, its development continues at a steady pace. Cities and countries are also recognizing its potential. A study by ThoughtLab revealed that out of 200 cities globally, 44 are investing to ensure their infrastructure is compatible with the metaverse. By 2030, approximately 700 cities are expected to implement various types of metaverse infrastructure, as projected by <u>ABI Research</u>. For example, New York City's Metropolitan Transportation Authority is looking to capitalize on this trend, aiming to both safeguard



New York's Metropolitan Transportation Authority is looking to capitalize on the metaverse in ways that protect and monetize its brand, unlike this unauthorized video game created in 2018. Screenshot by Everyday Arcade.

and monetize its iconic brand within video games and virtual reality platforms. In a significant move, <u>the European Commission</u> introduced a strategy in the summer of 2023 focusing on Web 4.0 and virtual worlds. This strategy is designed to guide the upcoming technological shift, ensuring a digital environment that is open, secure, trustworthy, equitable, and inclusive for EU citizens, businesses, and the public sector.

Immersive technologies provide planners with tools to enhance community participation, making it more inclusive and equitable. Yet, these tech-intensive tools often demand broader interdisciplinary expertise and collaboration with diverse teams to achieve optimal results. Interdisciplinary expertise and advanced empathy skills are becoming ever more important in the planning profession.

The next wave of urban innovations

Advancements in Urban AI will influence both the tangible ("hard") and intangible ("soft") aspects of urban systems, transforming the operation and governance of cities. <u>Urban AI</u> refers to any system that uses data sourced

from urban environments. This data, when processed through AI algorithms, yields valuable insights and applications for the city's sociospatial dynamics. The integration of AI and Internet of Things (IoT) technologies is anticipated to gain momentum, with an emphasis on data-informed decision-making and forward-looking analytics. In Germany, the **QTrees** initiative, an example of the practical applications of Urban AI, is a research collaboration between Birds on Mars and the Roads and Parks Department of Berlin's Mitte district. The service employs an AI-driven predictive model to determine the optimal times to water trees in a city of 3.5 million people.

As first reported in the <u>2022 Trend Report</u>, digital twins have become a crucial instrument for urban management and planning in numerous cities across the U.S. and globally. Their scope is now expanding from city dashboards to models that span entire metropolitan areas. A pioneering example of this is found in Orlando, Florida, which boasts <u>a</u> <u>regional digital twin</u> that spans an impressive 800-square-mile area, integrating real-time content.

In the upcoming decade, we can anticipate a shift as urban and regional simulations evolve to be more accurate, intricate, and valuable. The emerging <u>cognitive city</u> concept, which is an advanced form of the smart city, emphasizes proactive urban systems that deliver personalized and intelligent services. This evolution will likely challenge established decision-making protocols and planning systems. To adapt to these changes, planners should enhance their tech literacy and seek solutions across various sectors, including the gaming industry, private tech firms, and various start-ups.

Human rights in the digital world

The latest World Economic Forum <u>Global Risk Report</u> highlights a concerning trajectory for

personal privacy in the coming decade. As data collection intensifies with the increasing digitalization of our everyday lives and the capabilities of emerging technologies expand, individuals are set to face higher levels of surveillance and a greater exposure to misuse of personal data by both public and private entities. Often, this monitoring will occur without sufficient measures to ensure anonymity or without the explicit consent of the individuals involved. Research findings show that by using just 15 demographic attributes, 99.98 percent of U.S. residents could be re-identified from anonymized datasets. Moreover, in the U.S. data can be sold with relatively little regulation or limitations.

The ubiquitous spread of devices that collect data, coupled with AI systems reliant on this data, potentially paves the way for unprecedented control over individual freedoms and autonomy. Recognizing the imminent threat to human rights in this digital



Digital twins, such as the Orlando Economic Partnership's digital twin of the Orlando, Florida, region, are becoming key tools for urban management and planning in cities around the globe. Photo courtesy of City of Orlando.

age, the World Economic Forum's Global Coalition for Digital Safety has taken a proactive step in establishing the Global Principles on Digital Safety. These principles serve as a guideline, outlining the translation of human rights in the context of our increasingly digital world. Planners already use an abundance of data for informed decision-making. However, as the guardians of the well-being of the communities they serve, they must prioritize privacy and safety over efficiency, thus fostering greater trust and collaboration on preferred solutions.

The Futures of Decision-Making in Planning

How will planners do their work when AI and politics intersect? Illustrations by A. Richard Allen

Al capabilities have massively improved. Many planning tasks can be done by this technology, including data-based decision-making.



Lack of trust in AI and ethical concerns have prevented most planners from using this technology.

Job Evolution and Revolution



High-profile strike actions in 2023 were prompted by rapid technological and social change in several key industries, including the Writers Guild of America, the Actors Guild of America, and the United Auto Workers. Photo by Jenna Schoenefeld/*The New York Times*. The rapid pace of technological and social change is having a profound impact on how people do their jobs. Al is proving to be a major disruptor in the workplace, as workers and employers struggle to understand its utility and potential. A tight labor market and increasing education costs have given rise to a recent shift toward skills-based hiring and away from a focus on traditional degrees. Amidst this tumult is a wave of strikes highlighting the growing

confidence of workers in some industries and their desire to play an active role in the changing nature of work.

A continuing shift towards worker empowerment

Following a <u>wave of labor organiz-</u> ing in 2022, more recent developments have centered on increasingly high-profile strike actions in key industries. This includes strikes by the Writers Guild of America, the Actors Guild of America, and the United Auto Workers, as well as a near-strike by UPS employees. <u>Analysts note</u> that these actions have largely capitalized on post-COVID conditions that have empowered workers in a tight labor market. Critically, these strikes have centered not only on securing higher wages and better conditions, but also on the role of new technology and innovations within well-established fields. In the case of autoworkers, one concession won by the UAW was the inclusion of workers at two <u>electric</u>.

vehicle manufacturing plants in the agreement.

For planners, this shift toward worker empowerment amid technological change could signal some changes on the ground. This might include the economic health of communities, the uncertain impacts of technological innovations on different industries, and potential effects on contracting and procurement of newly unionized industries.

The contentious role of AI in the workplace

AI has exploded onto the scene this year (see <u>The AI Era</u>), especially in the workplace. Tech companies are rolling out AI companions for a huge variety of existing tools and software. Microsoft is leading the way with <u>CoPilot</u>, which will be integrated into the entire Office suite of apps. Zoom is already <u>offering tools</u> that can summarize meetings, take reliable notes, and send out action items and next steps to participants.

Contentious battles over the role of AI in the workplace were highlighted as part of the recent Writers Guild strike. Guild members were extremely resistant to studio efforts to integrate AI into the writing and production process, fearing that this may be the first step to abandoning human writers entirely. Ultimately, writers scored <u>a major victory</u> for the WGA on the AI front, with the new contract forbidding AI from producing source material, or from writing or rewriting literary material. This struggle is something of a signal for the future of the role of AI in the workplace generally. A recent report from Goldman Sachs on the effects of AI on large-scale economic growth finds that up to two-thirds of all current jobs might be exposed to some degree of automation, with Generative AI being a potential substitute for nearly a quarter of all current work.

The impacts of AI on planning and planners are expected to be significant as well, especially as AI tools like <u>ChatGPT</u>, <u>computer</u> <u>vision</u>, and <u>others</u> have the capacity to complement the efforts of local planners as described in APA's PAS Report 604, <u>Planning with Artificial</u> <u>Intelligence</u>. This is further discussed in the <u>PlanTech</u> section of this report.

Jobs insulated from the AI revolution

While fears of replacement and redundancy of jobs due to AI are rising, recent reports also point to a set of jobs and fields that might be <u>more insulated from AI</u> than others: those that are heavily based around complex interpersonal relationships or that might require the direct provision of complex services, care, or maintenance. These include the nursing and trades fields (e.g., plumbing, electrical, and construction), though <u>continued</u> worker shortages in these industries are a major element of uncertainty. Given the potential impacts of AI on the practice of planning itself, planners should consider how deeper integration of AI into the more technical aspects of planning work might require bolstering skills on the human side of planning. This might include core planning functions and skills such as interfacing with the community, building consensus among stakeholders, and coordinating across a variety of government agencies.

Skills-based hiring and reskilling needs

There is an ongoing notable shift toward skills-based hiring in both the public and private sectors. Dubbed "tearing the paper ceiling," the turn toward discrete skills and away from university-based degrees is increasingly seen as a better way to attract potential talent in a tight labor market. In 2022, Maryland <u>led</u> the way in no longer requiring fouryear degrees for many state jobs. By mid-2023, <u>12 other states</u> had taken similar actions.

There has been major action at the federal level in 2023 as well. The Office of Personnel Management released a <u>new handbook</u> to help other federal agencies implement skills-based hiring. And, as noted in Climate Mitigation: Skilled Workers, Tech, and Policies, last year saw the launch of the American Climate Corps, a major new Biden administration initiative to better train and equip young people with skills related to expanding clean energy, protecting natural resources, and advancing environmental and climate justice.

The turn toward reskilling is also being driven by major technological change. The World Economic Forum in a <u>2023 report</u> noted that 60 percent of companies are concerned about existing staff lacking critical skills, while more than half are concerned about attracting new workers that can fill critical skills gaps. Chicago is addressing tech skills gaps in the public sector by creating a <u>technology skills apprenticeship program</u>. Broader tech-focused and smart city reskilling efforts <u>are underway</u> in Long Beach, California, where residents are collaborating in identifying tech-inspired community pilot projects that will build skills in software development, cybersecurity, and information technology.

Reskilling and upskilling are also becoming important inputs to planning careers. Emerging technologies, societal shifts, and increasing environmental challenges require human and tech skills that so far have not been part of the planner's expertise. APA launched an <u>Upskill</u> <u>Planners initiative</u> in 2022 to fill some of these gaps and make sure planners are equipped with the skills they need to be successful in their jobs today and in the future (see also <u>Upskilling: Evolving Planning Competencies and Skills</u>).

Moving Toward a Polycrisis



Natural resources are dwindling as the world's growing population continues to fuel the destruction of ecosystems on land and at sea, including seagrass meadows and other critical ocean habitat. Photo by AlexeyMasliy/iStock/Getty Images Plus.

The climate emergency and its close connection to current global challenges, such as food insecurity, the migrant crisis, economic warfare, resource scarcity, and social disputes, highlights the high risk of failing to mitigate and adapt to climate change on a global scale. Natural resources are dwindling at an unprecedented rate across the globe as the need for both food and shelter for the world's growing population intensifies competing demands for land.

Beyond the massive importance of forests, wetlands, oceans, and other natural ecosystems to global biodiversity, continued destruction of the natural world is also a direct threat to the well-being of people worldwide. Holistic approaches are needed to resolve the developing polycrisis, in which some interconnected crises are competing while others require similar solutions.

Natural ecosystems nearing the point of no return

The dynamic relationship of pollution, biodiversity loss, climate change, natural resources consumption, and socioeconomic factors is a grave cause for concern, especially over the next decade. According to the <u>World Economic</u> <u>Forum</u>, half of the world's economic production is considered moderately to highly reliant upon nature, and the <u>collapse of ecosys-</u> <u>tems</u> will not only lead to irreversible <u>ecological damage</u> but also catastrophic economic and societal outcomes. Potential consequences include increased frequency of zoonotic diseases, heightened water stress, worsening potentially violent struggles over dwindling resources, decreases in crop yields and nutritional value, disastrous flooding, loss of natural flood protection systems, and loss of crops dependent upon pollinators and nature-based services.

No single strategy will solve or reduce climate change effects on its own. Food system transformation efforts, enhanced sustainability of production and consumption patterns, conservation prioritization, and climate/hazard mitigation approaches that benefit nature are important to prevent reaching ecosystem tipping points. Nations, regions, and communities will need resilient and supportive infrastructure, tools, and data to help avoid ecological collapse and the destruction of vital natural resources.



Climate change and related rising temperatures, extreme weather events, and natural disasters are increasingly threatening global food supplies and heightening food insecurity worldwide. Photo by JJ Gouin/iStock/Getty Images Plus.

The ocean's centrality to sustainability

Our world's <u>oceans are crucial</u> to global environmental and economic sustainability. When oceans are healthy, the natural benefits that they provide can mitigate the effects of climate change, biodiversity loss, and development issues not just regionally, but across the world. These "<u>blue carbon</u>" ecosystems, which store five times as much atmospheric carbon as tropical forests and can absorb it three times as fast, could be gone in 100 years if not prioritized now. Globally, 50 percent of salt marshes, 35 percent of mangroves, and 29 percent of seagrass meadows have been degraded or destroyed since the 1950s. The threats to ocean ecosystems and their significant and complex interconnection with the health of the entire planet adds additional uncertainty to the future unfolding of climate change impacts.

Presidential action for nature conservation

Conservation of land and oceans is vital to preserving vital ecosystems and slowing the impacts of climate change. President Biden has supported his <u>commitment</u> to conserve 30 percent of land and oceans by 2030 by launching the \$1 billion <u>America the Beautiful</u> challenge in April 2022 and ordering the creation of an <u>Ocean</u> <u>Climate Action Plan</u>, which was released in March 2023.

In addition, in August 2023, the Biden administration released <u>guidance</u> on how communities can assign value to environmental services when conducting cost-benefit analyses. Given the role of these types of analyses at the local level in evaluating development, this guidance could help communities better understand and account for the benefits of natural systems and their critical function in the health and well-being of people and the environment.

Increasing food insecurity

The number of people affected by global food insecurity has risen from 135 million in 53 countries in 2019 to 345 million in 82 countries in 2022. Those affected lack consistent access to the nutrition needed to sustain normal childhood growth and an active, healthy lifestyle. Climate change and related rising temperatures, extreme weather events, and natural disasters play an important role here, among other factors such as economic and social disruptions and land competition.

Developing countries are disproportionally affected by this crisis compared to the industrialized world, and this is expected to worsen with an anticipated <u>increase</u> <u>in food demand</u> by about 60 percent by 2025. While in the U.S. and Europe the food crisis is primarily a matter of unequal access of lowincome populations to high-quality, healthy food, <u>climate impacts on</u> <u>crops</u> in states such as Texas and Georgia, as well as countries such as Spain and Italy, are becoming increasingly common, and the U.S. continues to <u>lose productive farm-</u> <u>land</u> throughout the country to sprawling development at an alarming pace.

And while climate change is impacting where crops can grow, food production is also <u>a major</u> driver of climate change and biodiversity loss. Food production and consumption account for almost 30 percent of greenhouse gas emissions and 70 percent of biodiversity loss. In addition, we use about 70 percent of all freshwater for agriculture and over <u>35 percent</u> of global land area for agriculture and animal farming. Meanwhile, freshwater supplies are running dry due to climate change, pollution, and mismanagement, with a 40 percent shortfall predicted in 2030. And while we are using less land

INSIGHT FROM OUR TREND SCOUTS

"As we move towards a more circular economy where we minimize taking virgin resources, will we look at our landfills and cities as resources and start to mine the urban environment for critical minerals from electronics and lithium batteries, or for building materials?"

for pasture, the growth in intensive farming methods means we now <u>need more land</u> to grow animal feed such as soy and grain.

Innovations and potential future developments on the future of food production and agriculture are described in <u>Deep Dive: The</u> <u>Future of Food Production and</u> <u>Agriculture.</u>

Increased potential for resource-related conflicts

The trend of electrification of everything, which aims at greenhouse gas emission reduction to combat climate change, will require resources and metals needed for batteries and other technologies related to renewable energy generation. The demand for graphite, lithium, and cobalt is expected to <u>increase to</u> <u>450 percent</u> of the amount produced in 2018 by 2050. In this context, the climate crisis and related green transition can pose a risk for new global dependencies, leading to potential economic warfare and other conflicts.

Increasing global migration and the failure of local migrant integration

The number of global refugees has dramatically increased over the past two years. According to the UN <u>Refugee Agency</u>, as of May 2023 more than 110 million people were displaced globally due to human rights violations, violence, persecution, general conflict, and climate change. This represents the largest —Tanya Sakamoto, City of Calgary

ever single-year increase in global displacement, surpassing the record set during and after the unfolding of WWII, and these numbers are expected to continue rising.

Immigration into major American cities has also been surging since 2022 and is expected to continue, exacerbating existing affordable housing shortages and overwhelming shelters for the unhoused (see Housing Challenges and Solutions). Local governments are struggling to adapt and integrate hundreds of thousands of newcomers, highlighting the need for comprehensive immigration reform at the federal level. For now, cities like Chicago and New York are deploying temporary strategies, but the U.S. needs permanent infrastructure to integrate newcomers.

Deep Dive: Planning for a Hybrid World

People have always lived hybrid lifestyles. We're routinely blending multiple approaches, identities, or value sets in our daily activities as we seek to achieve work-life balance, forge a multicultural identity, or do any number of other things that make us human. However, during the COVID-19 pandemic, the concept of a "hybrid lifestyle" took on a new meaning: participating in a mix of in-person activities and online substitutes for in-person activities.

Some of the most obvious examples of potential online substitutes for in-person activities are remote work, virtual learning, telehealth, virtual conferences, e-commerce, and online gaming. For each of these activities, many people may choose to participate online on one occasion and in person on another. The emergence of this type of hybrid lifestyle points to a need for planners to integrate a new set of considerations into their work. In addition, this blending of real world and digital world experiences has the potential to provide unique opportunities for planning when it

comes to resolving challenges in the built environment, such as accessibility, or when co-creating with the community in equitable ways (see <u>Immersive City for and by the</u> People).

Previous *Trend Reports* have documented trends associated with hybrid work, retail, health care, and community engagement, as well as the digital infrastructure that makes hybrid lifestyles possible. The APA-Lincoln Institute special report *Digitalization and Implications for Planning* explored how the rapid adoption of digital versions of once-analog processes is affecting



The blending of real world and digital world experiences has the potential to provide unique opportunities for planning, pointing to a need for planners to integrate a new set of considerations into their work. Photo by Agencja Fotograficzna Caro/Alamy Stock Photo. the communities planners serve. But how might planning change if planners were to consider spatial and virtual needs and opportunities in tandem?

HYBRID SPRAWL. Among full-time workers who can perform their jobs from home, hybrid work arrangements are more common than fully remote positions or fully in-person positions. Hybrid participation in higher education and shopping are similarly widespread and commonplace. Many students attend a mix of online and in-person classes, and many shoppers browse in-store but buy online or buy online and pick up in-store. Telehealth has quickly gone from fringe to mainstream. And livestreamed concerts, conferences, and other events have made it possible for people who can't or don't want to attend in person to "be there" from anywhere.

For some activities, such as banking, bill paying, and socializing, mobile platforms and applications have vastly expanded on previous opportunities to participate by



Hybrid approaches that blend the virtual with the real world, such as augmented reality, offer new solutions to enhancing urban experiences and resolving challenges in the built environment. Photo by grinvalds/iStock/Getty Images Plus.

telephone or through the mail. Yet, demand remains for branch banks, check-cashing stores, and payment kiosks, and social media certainly hasn't eliminated house parties and in-person meetups of all kinds. Even in domains where online substitutes for in-person activities are rare or nonexistent, future advances in robotics, 3D printing, or the metaverse could open new hybrid opportunities.

While the possibilities and popularity of specific hybrid activities will continue to evolve, it's safe to assume that hybrid lifestyles are here to stay. Now is the time for planners to start considering hybrid options when trying to resolve challenges in the built environment.

PLANNING FOR A HYBRID

WORLD. So far, planning for a hybrid world has mainly been about planners responding to digitalization and its effects on the built environment. Much has been said already about the dramatic effects remote work and e-commerce have had on the demand for office and retail space, the vibrancy of downtowns. and the fiscal health of cities. As important as these effects are, they are likely just the beginning of an extensive realignment of land uses and activities in communities across the country. For example, planners are already helping communities reallocate land previously dedicated to office and retail to housing and other uses and identify opportunities for new retail and office uses in strategic locations. While local economic development has traditionally focused on attracting and retaining firms, communities may

need to <u>shift their focus</u> to attracting workers and promoting homegrown businesses. Housing supplies will need to expand and diversify to accommodate hybrid lifestyles, including more space for <u>home</u> <u>offices</u> and more <u>coliving</u>/coworking spaces.

However, in addition to this response to the digitalization trend, planners might want to proactively start considering how hybrid solutions might provide opportunities to overcome barriers and constraints posed by the physical world.

A well-known example that planners have started to embrace over the last several years is <u>online public</u> <u>participation</u>. However, even here planners still have much work to do. The ongoing evolution of hybrid lifestyles may require newer and better online public engagement methods, and planners will need to continuously adjust methods to meet process objectives, integrating a mix of online and in-person participation opportunities into every planning effort.

But community engagement

is not where it ends. Considering hybrid options, planners may need to rethink transportation system objectives and design, shifting their focus from enhancing mobility to ensuring accessibility, with cascading effects on mode prioritization, facility design, and system modeling. What if the construction of additional highways could be prevented by providing digital access

to certain systems and services? Similarly, this could be an oppor-

tunity to rethink how we plan for public spaces and their accessibility, as an extended variety of equitable utilizations can be provided through blending the virtual with the real world. Many museums have been using augmented reality (AR) applications to enhance the experiences of their visitors. A similar approach could be used to enhance urban design experiences in more equitable ways.

As briefly mentioned in <u>The Value of Youth</u>, younger generations are already using digital tools to enhance their experiences in the built environment, creating a sense of safety and protection. Planners might want to consider similar concepts in their work. For each activity, planners may need to consider how online options relate to broader community objectives, such as equitable access to economic and civic opportunities and efficient use of public resources.

One thing is certain: as more activities move online, communities will need to find new ways to accommodate digital infrastructure and minimize the digital divide. And planners may need to build or strengthen relationships with technology experts and upgrade their own skill sets to keep up with new trends and technologies that may influence the prevalence of online versus in-person activities. Upskilling may also be necessary for planners to help communities understand the benefits and tradeoffs associated with prioritizing one method over another.

These are just a few potential considerations, and while planners will need to continue responding to other implications for land use, the built environment, and public participation evolving from digitalization and hybrid lifestyles, it will be just as important to integrate hybrid solutions into the work planners do to enhance the experience in the built environment in more equitable and potentially more efficient ways. The future of planning might be about planning for a hybrid world.

Emerging Forms of Transportation



With the global urban air mobility market projected to reach over \$15 billion by 2030, companies are starting to test a variety of different electric vertical takeoff and landing vehicles in the U.S. and elsewhere. Photo courtesy of Joby Aviation.

Research suggests that private vehicles worldwide will be increasingly supplemented by emerging forms of transportation, including intermodal transit, autonomous vehicles, micromobility, and shared mobility. Consequently, <u>some projections</u> have U.S. car sales dropping by up to 30 percent by 2035 relative to 2015. Changes will also be seen in the commercial sector, with projects already underway to transform shipping by way

of drones, electric trucks, and digital twins to track deliveries. As discussed in the <u>2023 Trend Report</u>, electric vehicles (EVs) are perhaps the greatest coming shift, inducing changes in governance including EV incentives and <u>taxation of mileage</u> rather than gas. Land, air, and sea transport will require new and disparate forms of infrastructure and oversight, and planners will need to prepare to integrate these needs into their work.

Advanced air mobility nears liftoff

As first reported in the <u>2022 Trend</u> <u>Report</u>, the concept of flying cars keeps moving closer to reality. A variety of different electric vertical takeoff and landing vehicle (eVTOLs) prototypes are now being tested, and the global urban air mobility (UAM) market is projected to reach more than <u>\$15 billion</u> by 2030. Several companies, including <u>Alef Aeronautics, Archer, Volocop-</u> ter, and Joby Aviation, have received FAA exemptions to operate in U.S. airspace for research and development and have <u>begun piloting</u>. <u>test flights</u> in different cities. This technology has attracted <u>airlines</u> in particular, which are partnering with eVTOL companies to establish routes between airports and downtowns.

Critical to the success of UAM is the construction of vertiports hubs for eVTOLs-and companies are already negotiating deals for their development in the UK and Australia, with the FAA also releasing vertiport design standards. Integrating these structures into existing environments may pose a challenge, especially given the number that will be required (likely 20–30 for dense cities, plus twice that number of landing pads). Other barriers include safety, operations, regulations, and public perception of the technology. Though widespread deployment of UAM is still a long way off, planners can look to PAS QuickNotes 91, "Urban Air Mobility," and a forthcoming PAS

Report on advanced air mobility to

help them prepare for the coming of this potentially disruptive new transportation sector.

Autonomous vehicles struggle to deliver on promises

Autonomous vehicles (AVs) have made some progress since the <u>2022</u> <u>Trend Report</u>, as prominent AV companies have been successful in securing local licensing agreements and in bringing consumer vehicles to market. However, both manufacturers and taxi fleets have struggled to deliver on hefty promises amid major safety concerns.

More than 40 AV companies have licenses to drive in California alone, with Waymo and Cruise having the largest fleets. In August 2023, both companies were given clearance to operate in San Francisco, and both also had a presence in Austin and Phoenix with expansion to more cities pending. Tesla has deployed its Autopilot software to thousands of vehicles on the road, though a string of high-profile accidents and lawsuits have made regulators and consumers wary of the technology. AVs have been facing a flurry of major issues, including sudden stoppages that have caused accidents and prevented emergency response personnel from reaching their destinations. In October 2023 a woman was pinned beneath a Cruise vehicle after she was hit by a driver-operated car in San Francisco. Later that month, the California Department of Motor Vehicles halted Cruise operations in the city, and shortly thereafter Cruise opted to pause operations

Cruise opted to pause operations of its remaining fleet, prompting its CEO to resign. Similar to concerns about

widespread EV adoption, critics worry that AV expansion will disincentivize public transit use and impede pedestrian mobility. Planners should continue to monitor the challenging rollout of AVs and consider the <u>potential implications</u> of widespread deployment of this technology at the local level.

Growing investment in U.S. high-speed rail

Significant investments in highspeed rail are reshaping transportation in the U.S. The \$1.2 trillion U.S. infrastructure bill allocated an historic <u>\$170 billion</u> for the enhancement of railroads. Highspeed rail can provide numerous environmental advantages by replacing air travel, personal car trips, and even long-distance trucking. Among other projects under development, new Amtrak Acela high(er)-speed trains will begin operations in 2024, connecting Boston, New York, and Washington, D.C. However, a critical challenge to high-speed rail implementation across the U.S. remains outdated infrastructure that can't support high-speed service.

High-speed rail can also stimulate economic growth across various sectors. Projects like the <u>California</u> <u>High-Speed Rail</u> and the <u>Brightline</u> <u>West</u>, which will connect Las Vegas and Southern California, are driving economic growth with strong union worker participation. California's

High-Speed Rail Project alone has created over 11,000 union jobs, with 70 percent benefiting disadvantaged communities in the historically challenged Central Valley. However, even with these notable benefits, the construction of new high-speed rail infrastructure in the U.S. is significantly more expensive and often takes far longer to complete than in countries in Europe and around the globe. But given these recent major investments in high-speed rail, it's clear that the federal government and several states are increasingly interested in the potential climate, transportation, and economic benefits of widespread high-speed rail deployment.

Interest sparked in truck electrification

While electric passenger cars are already becoming normalized, larger EVs such as freight trucks and buses have been slower to materialize. Change, though, appears to be on the horizon. In less than a year after California

voted to ban new sales of gas-powered cars by 2035, it has expanded on this target to mandate that 50 percent of all heavy-duty trucks sold in the state be fully electric by the same year. While this has prompted concern from truckers, recent data from the North American Council for Freight Efficiency shows that electric medium- and heavy-duty trucks on the market can travel an excess of 300 miles on one charge. Long-haul routes still pose a challenge, however, and may require more stops to charge along the way. Swappable batteries have promise to resolve that issue for heavy-duty trucks as well as personal EVs, though the global resource consumption implications of increased battery production remain (see Persisting Transportation Inequities). Another concern is the up-front expense, with electric trucks costing up to three times as much as diesel ones. To help alleviate this burden, Mack Trucks recently introduced a subscription program for its medium-duty electric truck, with an option for



"Friendly robots" like LIKU, a robotic teaching facilitator providing education to seniors in Seoul, South Korea, can be used to fulfill a wide range of community needs. Photo by Imago/Alamy Stock Photo.

purchase at the end of the plan. Other types of large vehicles are also beginning to go electric, with Portland, Oregon, unveiling its first <u>electric garbage truck</u> and Amtrak debuting its first <u>electric bus route</u> in Seattle. Though not yet widespread, the electrification of large and heavy-duty vehicles has begun, and planners must be prepared to accommodate these changes in both urban and rural areas.

Planning for robots

Meanwhile, robots in all shapes and sizes are entering our cities, offering new transportation options and beyond. While <u>personal delivery</u> <u>devices</u> that deliver packages and meals in the air and on the ground are already coming, trends point to the potential for robots to fulfill a variety of other functions within society. Seoul has recently developed plans for a <u>robot-friendly</u> <u>city</u>, proactively envisioning the wide-ranging integration of robots into everyday life. In nations grappling with the challenge of low birth rates, especially in Europe and Asia, <u>caregiving</u> for the elderly and

INSIGHT FROM OUR TREND SCOUTS

"With an aging population and the increasing cost of labor, we are seeing automation and robotics happening across all sectors of the economy."

> —Lynette Cheah, PhD Singapore University of Technology and Design

the fulfilling of critical functions within cities may increasingly fall upon robots and other autonomous technologies. This includes mundane but vital services, such as <u>street</u> <u>cleaning</u>, <u>public safety</u>, and <u>transit</u> <u>services</u>. With potential widespread adoption of these recent innovations looming, planners will need to consider how this new technology can be <u>effectively integrated</u> into their cities and communities to ensure they won't disrupt accessibility of public spaces.

Continuing Changes in Work and Retail



Emerging retail trends include increasing interest in purchasing secondhand goods as a conscious lifestyle choice, both through online resale platforms and in brick-and-mortar thrift stores. Photo by RyanJLane/E+/Getty Images.

In the wake of the post-pandemic landscape, our evolving world of work and consumer behaviors is dramatically reshaping cities and communities. From the rise of hybrid work models and shifting urban demographics to innovative conversions of office spaces, the exploration of four-day workweeks, and emerging e-commerce trends, this multifaceted transformation presents both challenges and opportunities for urban planners. As we delve into

these interconnected trends, it becomes clear that planners must navigate these dynamic shifts to shape resilient, adaptable, and inclusive cities for the future.

Post-pandemic work trends continue to evolve

As the pandemic recedes, the world of work continues to evolve. In the post-pandemic U.S., a dominant trend is the adoption of a hybrid work lifestyle combining remote and in-office work (see Deep Dive: Planning for a Hybrid World). A 2023 Pew Research Center survey

found that 41 percent of remote-capable workers now follow hybrid schedules, up from 35 percent in January 2022. During that time the number of people working from home full-time decreased from 43 to 35 percent, but this is still significantly higher than the seven percent who worked from home pre-pandemic. Worldwide, over onethird of desks <u>remain unoccupied</u> throughout the week, though <u>Asian</u> and European employees have returned to workplaces faster than their U.S. counterparts. Planners must closely monitor these evolving preferences as to how, when, and where people work, as the unpredictability of future work arrangements has a significant impact on infrastructure, transportation, and city development patterns.

Downtowns revive, suburbs expand, and Zoom towns wonder

Contrary to predictions of a <u>doom</u> <u>loop</u>, downtowns are proving their resilience. The trajectory of recovery varies across urban landscapes, as each city has its unique dynamics. Despite well-publicized challenges such as crime and shifts in work patterns, cities like <u>Chicago</u> <u>and New York City</u> are experiencing a resurgence in population, with Chicago boasting <u>more downtown</u> <u>residents</u> than before the pandemic.

Although only cities in the South have fully regained their pre-pandemic growth rates, numerous cities in the West are witnessing a resurgence in population. The message is clear: downtowns are not fading away; they are evolving. At the same time, suburban and exurban growth rates are surpassing those of core cities. This trend underscores the growing appeal of living in outlying regions, reflecting the shift towards remote work. This narrative of transformation and adaptability showcases the dynamic nature of our cities and underscores the need for planners to closely monitor and be prepared for these changes.

"Zoom towns" such as Bend, Oregon, saw <u>substantial growth</u> during the pandemic as tech workers from Silicon Valley and Seattle moved in, causing an almost 28 percent surge in average home prices. However, the recent <u>return-</u> to-office policies of tech giants like Google, Microsoft, and Amazon are <u>raising questions</u> about the future of these communities. What will be the negative impacts of the exodus of people who turned to these towns during the pandemic? These uncertainties leave Zoom towns at a crossroads, contemplating their future.

Office-to-residential conversions gain interest The reduced demand for office spaces due to remote and hybrid work has resulted in rising

U.S. office vacancy rates, which reached record highs in the second quarter of 2023. This presents an opportunity for office-to-residential conversions: one study suggests 34 percent of office buildings in 14 major North American markets could be potential candidates. But office-to-multifamily conversions remain relatively rare because of regulatory and market challenges and building standards. Mayors in several U.S. cities are considering loosening rules to expedite office-to-residential conversions; other potential solutions include fee waivers and tax incentives. To further accelerate this trend, the Biden

administration launched a <u>com-</u> <u>mercial-to-residential conversion</u> <u>initiative</u> in October 2023. Planners should explore these potential opportunities to reshape downtowns and provide much-needed housing for residents.

Governments explore the four-day workweek

Last year's Trend Report highlighted four-day workweek pilots and their successes in the private sector. Now this trend has made it into the public sector, with states including California, Hawaii, Maryland, New York, Pennsylvania, and Washington <u>exploring bills</u> to promote or mandate this shift. At the federal level, U.S. Rep. Mark Takano reintroduced a bill to lower the standard workweek from 40 to 32 hours. If this idea of a shortened workweek gains traction, workers will rejoice while planners will need to consider potential impacts on transportation, transit, and the continuing evolution of the workplace.

New twists on e-commerce

Along with the work landscape, the nature of retail continues to evolve. A new twist on e-commerce is live shopping, in which brands sell products through livestreams on digital platforms, frequently in partnership with influencers. Live shopping is reshaping how consumers engage with products and brands, emphasizing real-time interaction. In 2023, live shopping was estimated to generate \$32 billion in U.S. sales. Additionally, with the retail industry moving towards an omnichannel approach, social selling-deliberate use of social media interactions to build relationships with the customers as a central element of the sales process—has become an integral part of the seller-buyer interaction. Studies show that 78 percent of social sellers outperform their peers who do not use social media. Planners should continue to track the impacts of these and other evolving e-commerce trends on local economies, transportation networks, and land-use patterns.

Another look at secondhand goods

At the same time, we are seeing the increasing adoption of secondhand goods as a conscious lifestyle choice. Spurred by pandemic-induced supply chain issues, rising inflation, and the growth in digital resale and peer-to-peer platforms, higher-income and younger populations are joining lower-income groups in purchasing used items, from clothes to furniture and even plants. This market is projected to reach <u>\$325 billion</u> by 2031, underlining the growing interest in more sustainable consumption patterns mainly led by <u>Gen Z</u>. In addition to tracking the potential impacts of the changing retail landscape as noted above, the secondhand trend suggests planners may also want to consider whether their communities have spaces that can accommodate repair and repurposing, allowing residents to engage in secondhand and upcycling activities.

The U.S. Infrastructure Crisis



Illustration by Christian Blaze

Updating critical infrastructure will require interdisciplinary professional engagement and reimagination.

By Bill Cesanek

Bill Cesanek, AICP, is a Vice President and Practice leader for Infrastructure/Urban Planning at CDM Smith and co-leader of the <u>APA</u> <u>Water + Planning Network</u>.

Over the last decades, the <u>ASCE's</u> <u>Report Card for America's Infra-</u>

structure has repeatedly given bad grades for U.S. infrastructure in all areas, painting a picture of a dire infrastructure crisis. Drawing from your experience in the industry, what would you pinpoint as the main infrastructure challenges facing the U.S. in the next decade given this current state and expected additional impacts from climate change? Infrastructure systems have a long history of being built under separate planning processes with siloed ownership and responsibilities, and then being impacted by neglectful maintenance and improvement.

At least three major challenges face U.S. infrastructure. First is the enormous and costly need to revitalize and improve our legacy infrastructure.

Second is the demand for smarter planning for future infrastructure that leans more on sustainable solutions and recognizes trends in land use change affecting urban infrastructure, such as conversion of retail and office space.

And third is recognizing the importance of creating new mechanisms to more broadly disburse the Bilateral Infrastructure Law and Inflation Reduction Act monies, authorized by Congress to address infrastructure needs.

The planning community has been struggling with legacy systems that are expensive to adapt to changing urban forms and needs. Most infrastructure was installed over the past 100-plus years, much serving development built before environmental advocates and disadvantaged communities had the voices they are gaining. These new voices suggest that we need to focus our efforts on reimagining infrastructure for the next 100 years and rethink how we fix the infrastructure that served us for the past 100 years.

What is the planner's role and what can planners do to mitigate this crisis and prevent it from worsening in the future?

Approaches to catch up on maintenance and improvement of legacy infrastructure, while simultaneously attending to equity, health, and environmental issues associated with legacy infrastructure, are emerging.

Planners are moving ahead in both traditional and innovative ways. Standard tools, like comprehensive/sustainability planning, zoning, and development review, will continue to play key roles, but with broader community input to set direction and computer Al/machine learning support. Several evolving planning processes, such as asset management, hazard mitigation planning, public engagement, scenario-based capital planning, and geospatial analysis, along with financial requirements for renewal funding, are expanding the tools available to planners. Important new sustainability measurement systems are being developed, like the Institute for Sustainable Infrastructure's Envision sustainability rating system.

Perhaps most important of all is a shift to recognize that it requires the interdisciplinary engagement of infrastructure professionals to create coherent mechanisms for maintenance and planning of

INSIGHT FROM OUR EXPERT

"Several evolving planning processes, such as asset management, hazard mitigation planning, public engagement, scenario-based capital planning, and geospatial analysis, along with financial requirements for renewal funding, are expanding the tools available to planners."

infrastructure systems, including engineers, landscape architects, architects, scientists, ecosystem experts, and sociologists (and more!).

We are now entering an era of transformation in how we plan for infrastructure. It is no longer sufficient that infrastructure meets the demands of growth. Communities want to maintain existing infrastructure, but they increasingly seek to foster transformational change.

APA offers an expanding set of <u>guidance</u> to planners on how to address these issues, including the PAS Reports <u>Planners and</u> <u>Water</u> and <u>Planning for Infrastruc-</u> ture Resilience. The conversations among all the APA Divisions now recognize the interdependencies of the energy-water-food-transportation-equity nexus. The tools that planners use must quickly evolve to meet this growing challenge.

The signals we need to earn about and watch

"The future is already here—it's just not very evenly distributed."

Looking at the signals or potential future trends, this quote by sciencefiction writer William Gibson seems like a perfect fit. Not knowing what direction items in this section will take, we may want to keep them on our watchlist for now and learn more about them. We are looking at potentially **game-changing technological advancements** that might impact how we will do our **work**, what we may **eat**, where we might **live**, or how long we may be able to live, among many other things.

Check out <u>APA's Trend Universe</u> for more signals and potential future trends.



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Innovations in the Energy Sector



Hosting 7,000 offices and 2,000 homes on 60 acres, Sweden's Stockholm Wood City will be the world's largest mass-timber development, exemplifying a shift toward eco-friendly practices in the construction industry. Illustration courtesy of Atrium Ljungberg/Henning Larsen.

As renewables like solar and wind grow their market share, emerging challenges in energy efficiency, storage, capacity, and transmission are starting to take center stage. Many places are taking a second look at nuclear power to meet increasing demand, though this sector is increasingly disrupted by new technology and global politics. Entirely new energy sectors such as fusion power hold promise to help meet global energy needs, though the real-world applications for this and other nascent technologies are still uncertain.

Energy efficiency through innovative construction practices

The construction industry is shifting towards eco-friendly practices, including the use of lumber, which sequesters carbon and emits fewer emissions than concrete. <u>Stock-</u> <u>holm Wood City</u>, a massive 60-acre mass-timber development, plans to host 7,000 offices and 2,000 homes, setting new eco-friendly standards. Additionally, innovative solutions are reducing the environmental impact of traditional building materials. <u>CarbonCure Technologies</u> stores carbon within concrete, significantly lowering its footprint. This technology has been licensed to 700+ customers in 30 countries, with Amazon's upcoming Arlington headquarters using it in 90 percent of their concrete.

The adoption of green construction and growth in climate-friendly financial markets is projected to cut the construction industry's carbon footprint by <u>23 percent by 2035</u> and unlock \$1.5 trillion in new investment opportunities in emerging markets over the next decade. This trend is significant as it promotes sustainable building practices and encourages a shift away from carbon-intensive materials, influencing construction standards and codes. Moreover, it fosters circularity in the construction industry, which could have far-reaching implications for sustainability goals.

Floating solar arrays

An emerging approach to solar installations, <u>floating solar arrays</u> ("floatovoltaics") are a demonstrated technology with some significant upsides. At large scales, they can cover up to 30 percent of lakes or reservoirs, with added benefits of decreasing evaporation in times of drought and reducing algae blooms. These arrays also stay cooler than land-based arrays, resulting in more efficient collection and storage. Floating solar arrays are already in active use at <u>Fort</u> <u>Bragg in the U.S., the Netherlands</u>, and at much larger scales in <u>China</u> and <u>South Korea</u>. There are concerns that large-scale use of floating arrays may cause unforeseen damage to local ecosystems in natural lakes, though there is significant potential for their use in reservoirs. Much like other forms of renewable energy, the growth of this technology would likely lead to local conflicts around the use of natural areas for the siting of renewables.

Generating and storing energy from the soil

An experimental class of new batteries aims to both generate and store energy from the natural decomposition of soil. <u>Bioo</u>, a Barcelona-based start-up, has been developing a series of panels that can be buried beneath the soil to capture latent energy from biological processes. This energy can be used on site to power a <u>vari-</u> <u>ety of potential uses</u>, such as irrigation systems and above-ground lighting. The applications might be



Floating solar arrays like the Department of Defense's 1.1 MW system in Fort Bragg, North Carolina, are an emerging approach in solar energy development. Photo by Sharilyn Wells/Fort Liberty Garrison Public Affairs Office.

significant within the agricultural sector, as these biological batteries may prove to be useful for an array of <u>necessary sensors</u> for monitoring crop health currently powered by chemical batteries that must be changed regularly. Though the technology isn't yet being developed at scale, Bioo is attracting attention

from major agricultural corporations that may benefit from significant cost and labor savings.

Solving the storage problem

Futureproofing energy grids and enabling a large-scale transition to green energy will require

breakthroughs in storing the energy produced by renewables like wind and solar and efficiently transmitting that energy to where it is needed on demand. Major investments in building grid resilience are leading to price declines in battery storage systems, and emerging technologies, such as water batteries and sand batteries, are contributing to the diversification and innovation in this space. As all forms of renewables spread, these technologies could be a boon to climate mitigation and grid resilience, though planners may begin to encounter some of the more typical problems inherent to siting energy infrastructure.

Differing takes on nuclear power

There are more than 400 <u>active</u> <u>nuclear power plants</u> across the world, generating about 10 percent of electricity globally, but countries are taking differing approaches to this controversial energy source. <u>Germany</u> shut down its last nuclear power plants in April 2023, while in <u>Asia</u> nuclear power is on the rise, with 21 plants currently under construction in <u>China</u>. The first <u>new American nuclear reactor</u> in 30 years came online in April 2023, but there doesn't seem to be much current appetite <u>in the U.S.</u> for further nuclear development.

Closing nuclear plants without adding other low- or zero-emissions sources of power could lead to major emissions increases. Adding to these challenges, smaller modular nuclear reactors, which had once been thought to solve some of the issues related to highly radioactive nuclear waste, may in fact generate more radioactive waste than largescale nuclear plants. Given the low carbon nature of nuclear power, some countries and advocates see it as a critical piece of the climate mitigation and energy production puzzle; at COP28 in December 2023, more than 20 countries, including the U.S., signed a declaration calling for the tripling of global nuclear energy capacity by 2050. Others, though, believe that until the



Georgia's Plant Vogtle, the first new American nuclear power plant in 30 years, came online in April 2023. Photo courtesy of Georgia Power Company.

problem of nuclear waste is truly solved, nuclear power is far from a sustainable solution.

Fusion energy breakthroughs continue

Ongoing innovations in fusion power could lead to the power of the sun at our fingertips. Recent breakthroughs in waste- and emissions-free fusion energy could help to eliminate the drawbacks of fission-based nuclear power and solve critical questions about global energy needs. While practical fusion energy is still likely decades away, National Ignition Facility scientists in July again <u>successfully generated energy</u> in a fusion reaction. This experiment nearly doubled the energy output of the initial breakthrough in December 2022, demonstrating continued advancements in the field. On the heels of this work, the Biden administration recently announced plans to build the <u>world's first commercial</u> <u>fusion energy plant</u> within a decade. While ambitious, advancements within this timeline could be key to addressing the climate crisis.

Extracting energy from the air

Long the domain of science fiction, technology that extracts energy from the air itself has taken a few small steps toward reality. First emerging in 2020, "air generator" technology is based on the same principle behind clouds and the formation of lightning by capitalizing on the latent energy in ambient humidity. Recent innovations have successfully demonstrated this technology with common porous materials (such as wood), and at larger scales than previously shown. These "larger-scale" demonstrations are relative, however, with one prototype generating nearly enough power to light just a single pixel. There are major challenges of scale, cost, and long-term reliability as the technology is far more efficient in more humid environments. Nevertheless, future developments and the deployment of this technology at scale could signal major energy implications for the future.

Mitigating Climate Change Through Geoengineering



Interest is growing in direct air capture technology to remove carbon from the atmosphere, with the first commercial U.S. DAC plant starting operations in Tracy, California. Photo by Jim Wilson/*The New York Times.*

Geoengineering is one of today's most contested fields of climate science. The <u>2023 Trend Report</u> touched on some of these concerns, but the public debate surrounding it has only accelerated. While experiments in the field have been limited, there are concerns that continued focus on geoengineering solutions will undermine the urgency of reducing greenhouse gas emissions and limiting climate change from the source. Nevertheless, the diversity of geoengineering innovations,

ranging from direct removal of carbon from the atmosphere to reducing temperatures by managing solar radiation, continues to grow.

Direct air capture

Though technically a form of geoengineering, <u>direct air capture</u> (DAC) is significantly less risky than other methods of this approach. Interest in this technology has been rapidly growing, especially as projections indicate that net-zero emissions are no longer sufficient to avoid climate disaster; existing carbon must actively be removed from the atmosphere. As a result, public and private funding alike is turning towards DAC projects. Venture capitalist <u>funding</u> for carbon capture and storage initiatives reached nearly \$4 billion in 2022, and had already totaled \$1.8 billion by the end of the first quarter of 2023. In August of 2023, the U.S. Department of Energy announced that it will <u>invest \$1.2 billion</u> in developing regional DAC hubs across the country, beginning with Texas and Louisiana. In California, researchers are studying how to create a <u>DAC</u> <u>hub</u> that would not only remove and store carbon but also provide clean energy and manage water. The expansion of carbon centers such as this one should be considered in community planning, given the potential impacts on infrastructure and civil service systems.

The cloud seeding renaissance

<u>Cloud seeding</u> is a well-established (though still controversial) form of geoengineering that induces precipitation by "seeding" clouds with chemicals or other materials. While the practice has been <u>used throughout the world</u> for decades, it is expanding into new markets as crises around the availability of water, persistent drought, and <u>desertifica-</u> tion take hold. Arid and agricultural states in the U.S. are emerging as

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hotspots for cloud seeding; Nevada, Utah, Texas, Idaho, California, and New Mexico have all expanded their use of the technology for recharging aquifers and reservoirs, supplementing mountain snowpack, and watering crops like wheat and cotton. Similarly, Mexico has made investments in the technology and commissioned cloud seeding firms to relieve persistent drought conditions in key areas. While measuring the actual impacts of cloud seeding is notoriously difficult, Mexican officials contend that it created 40 percent more rain than normal in several key locations. With continued innovations in the field, cloud seeding firms and advocates hope to bolster its use to help improve drought conditions, recharge critical water sources, and even reduce the potential for wildfire.

Bioengineered trees

Trees bioengineered to grow more quickly and store more carbon are moving from concept to reality. Biotechnology company Living Carbon



Biotechnology company Living Carbon intends to plant more than four million trees bioengineered to help manage climate change, though critics have begun to voice concerns over the lack of research into potential long-term impacts. Photo by Audra Melton/*The New York Times*.

planted <u>genetically modified poplar</u> <u>seedlings</u> on public land in Georgia in February 2023. These <u>modified</u> <u>seedlings</u> can grow 53 percent larger over five months and uptake 27 percent more carbon dioxide compared to standard seedlings. Living Carbon intends to plant upward of four million more by mid-2024, though critics have begun to <u>voice concerns</u> over the lack of multigenerational research into the modified trees and their interactions with other organisms over time. Likewise, organizations that certify sustainable forests do not approve those with bioengineered trees. Though China has been <u>planting bioengineered trees</u> since the early 2000s, it is the only country to do so on a large scale, and the U.S. Forest Service has not taken a stance on the issue. Its decision could have widespread implications for federally protected lands.

Solar radiation management

Solar radiation management (SRM) encapsulates a number of technologies that reduce the amount of sunlight that reaches the ground. <u>Methods</u> proposed to achieve this include marine cloud brightening through aerosols, cirrus cloud thinning to permit more heat escape from Earth, and sun shields in space and stratospheric aerosol scattering in the upper atmosphere that would reflect light away from Earth.

Compared to DAC, the indirect

effects of SRM are much less established. Nevertheless, both the Biden administration and the EU have signaled that they are open to the prospect of studying SRM, and over the past three years NOAA has invested <u>\$22 million</u> into SRM research. Private companies, too, have been conducting their own investigations into the subject, and in some cases, experiments. In September 2022, UK researchers released sulfur dioxide into the stratosphere via a weather balloon, and within the next year a California-based company wants to release iron-rich particles through the exhausts of ships in an attempt to destroy methane.

Global debate over geoengineering

SRM is one of the most controversial forms of geoengineering, given that its impacts are unknown and it carries the risk of <u>termination</u> <u>shock</u>, whereby if its implementation was suddenly stopped, warming could accelerate to exceed current projections. Additionally, its

effects would not be limited to one country's borders, so there is growing debate over how it should be governed, and by who. The international organization Degrees is currently working to confront these challenges by engaging with countries that would be most vulnerable to SRM. In January, over 440 scientists signed an open letter which calls for prohibiting public funding, experimentation, or deployment of SRM technologies. The following month, an opposing letter was signed by over 110 scientists encouraging further research into the potential of SRM. Governmental tension regarding geoengineering has already been seen in Mexico, which has banned solar geoengineering experiments after an American company released sulfur dioxide particles into its airspace without permission. Such conflicts indicate the need for planners and practitioners from many countries to come together in preparing for multiple futures that may include a wide range of potential geoengineering outcomes.

The Futures of Global Climate Action

How the scenes might play when consumerism and science go head to head.

The world is deglobalized. Almost all products in the U.S. market are either produced in the U.S. or sourced from friendly markets.



Conventional climate mitigation efforts are insufficient. Climate change continues to worsen.

The world is more globalized than ever before.

The Devil Wears Prada; Maximum Film/Alamy

Wall-E; Cinematic/Alamy

Curiosities and Game-Changing Innovations



Factory in a Box technologies can bring products to market rapidly and deliver them locally, potentially transforming (and disrupting) the manufacturing and supply chain landscape. Photo from HVMCatapult video.

While it is impossible to predict the impacts of nascent social and technological change, it is still helpful to investigate recent and potentially game-changing innovations. Awareness of recent developments that are only in their infancy, but that have the potential to signal massive changes in how we live, work, and play, can help planners build a more holistic understanding of the present's deeply uncertain impacts on the future.

From adaptable and deployable factories to the promise and pitfalls of gene editing or the major potential implications of radical life extension technology, these signals and current-day curiosities could be game-changers for the future.

Life extension and reversing aging

Life extension technology, as well as experimentation into effectively reversing the process of aging, is a major area of research today. In 2023, scientists at Harvard Medical School <u>manipulated the epigenome</u>, which provides instructions to cells on which genes to turn on or keep silent at any given time, to <u>age mice</u> on an accelerated timeline and then reverse the effects of that aging. Individual experimentation into the science of life extension and age reversal received extensive media coverage in 2023. <u>Tech exec Bryan</u> Johnson is attempting to turn back the clock through a personal program of exercise, diet, supplements, and lifestyle changes he calls <u>Project</u>

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<u>Blueprint</u>. Continued progress within this nascent but popular area of study could signal significant and highly uncertain social impacts in the future. At a rudimentary level, if people are living far longer than they currently do, then they may be working longer, consuming more resources, and requiring more services over a much longer period of time. The implications are vast for nearly every aspect of society.

CRISPR and gene-editing technology

CRISPR (clustered regularly interspaced short palindromic repeats) is an innovative and groundbreaking method for editing the genome of living things. Medical advancements based on CRISPR-related discoveries are already in use across the globe. Many scientists and researchers believe that the revolutionary potential of this technology is significant. Some of the most promising potential and ongoing uses are related to growing pest-resistant and highly resilient food crops (see <u>Deep Dive: The Future of Food</u> <u>Production and Agriculture</u>); curing and treating cancers and a huge variety of rare and life-threatening illnesses; and quickly detecting and addressing emerging and highly contagious viruses before they are able to spread. Most recently, CRISPR-derived treatments have been approved by the FDA for <u>treating sickle cell disease</u>, a life-threatening blood disorder.

Broadly, there is general acceptance and interest among scientists in using CRISPR for these purposes. However, there is also a broad scientific consensus on the potential ethical risks and implications should this technology be used for eugenics or the "enhancement" of the human genome. Given the rapid advancements and innovations related to CRISPR that are already emerging, interest is growing in global governance and regulations around accepted ethical standards and uses. While this signal might not be directly connected to planning, its potential impact on society

will most likely be game-changing, which is why it might be worth watching.

Bringing back extinct species

This signal, discussed as part of a Deep Dive into rewilding in the 2023 Trend Report, has already seen some significant recent updates. The concept of resurrection biology is centered on the revival or recreation of extinct species of plants and animals. The current-day destruction of the natural world, the impacts of climate change, and the steady march of ecosystem loss is leading to the rapid extinction of plant and animal species across the world. Notably, resurrection biology might be critical not just to bring back long-lost species, but to reverse the ongoing extinction of current species.

<u>Current de-extinction science</u> relies on three different methods: cloning (using DNA of extinct species to clone new animals), back-breeding (for example, selectively breeding elephants to recreate

extinct mammoths), and gene editing (adding or removing traits from existing species' DNA to recreate extinct species). Media interest largely centers on the resurrection of mammoths, dodos, and other high-profile extinctions. However, this concept's application in more mundane but vitally important circumstances may also be significant. For example, insect extinctions are a major threat to the resilience of the global food supply and the health of ecosystems. If critical extinctions do occur, this technology might one day be vital to reversing major impacts by reviving key species. Planners should consider not just the long-term implications of this technology, but also the present-day circumstances (ecosystem loss and the rapid extinction of plant and animal species) that drive its continued relevancy.

Factory in a Box (FIAB)

Recent evolutions of additive manufacturing processes, such as 3D and 4D printing, are giving rise to

research and prototyping of fully functional and autonomous mobile factories, dubbed Factory in a Box. A FIAB is a mobile and compact technology that uses additive manufacturing to bring products to market rapidly and deliver them locally. Analysts point to the FIAB's potential in a variety of situations, including on-site production of equipment (even additional FIABs) and supplies to address acute supply chain challenges. A recent project focused on the utility of a FIAB in a post-disaster scenario to rapidly manufacture and distribute goods. The potential impacts, however, might extend to more significant disruptions to traditional manufacturing processes, supply chains, and eventually retail. Still, these initial forays into what may one day be the precursor to Star Trek's replicator are only in the early prototyping stages and will rely upon the significant growth and advancement of 3D-printing technologies and materials.

The Futures of Food Production

According to the <u>Copenhagen Institute for Futures Studies</u>, about 50 years ago, the main challenge in the food industry was the question of how food production could keep up with the pace of population growth. Efficiency and the calories that could be produced were the priority. But today, <u>the main challenges</u> are how we can produce healthy food sustainably and how it can be equitably distributed. Of the four billion metric tons of food

produced for human consumption every year, one-third gets thrown out. Meanwhile, climate change as well as social and economic disruptors are increasingly threatening food production (see Moving toward a Polycrisis). According to the World Economic Forum, global food consumption will increase by 1.4 percent annually in the next 10 years, while production is anticipated to increase by only 1.1 percent per year. It is estimated that by 2050, global food production will have to increase by 70 percent.

The future of food production

is moving in three main directions to resolve these issues. First is the deployment of technologies, such as AI, robotics, and new forms of DNA editing, to make crops more resilient to climate change-related extreme weather events and pests. Second is moving food production closer to consumers through urban agriculture. Third is the food industry's (and others') experimentation with producing synthetic foods in laboratories and growing crops in outer space to provide alternatives to an unsustainable and inhumane



New technologies, such as CRISPR, can help increase plant resilience and adaptation to climate change, allowing crops to grow in more places and reduce the need for pesticides, fertilizer, and water. Photo by Shaiith/Shutterstock.

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livestock industry and find substitutes for conventional agriculture.

MAKING AGRICULTURE MORE

RESILIENT. Conventional agriculture has seen <u>automation and</u> <u>robotics</u> tech innovations over many decades. Al has also <u>reached</u> <u>the ag sector</u> and is being used for weeding, to determine the health of crops, and to detect pests and other issues. However, these tech innovations alone won't be enough to counter the future impacts of climate change.

Plants have evolved and adapted to changing climates for millions of years through the process of natural selection. What is different today, however, is the pace at which the climate is changing. Scientists are now looking at how crops and their biomes changed in the past, hoping to understand how we can mimic the process of genetic changes and speed up their evolution so that they can adapt to the ever faster-changing climate. This can be done through CRISPR, a new technology that selectively modifies



The global market for vertical farming, a version of urban farming where plants are stacked vertically and mostly indoors, is anticipated to grow by 26 percent annually and will reach \$42.5 billion by 2032. Photo courtesy of Plenty.

DNA without introducing any foreign genes into the edited organism (see <u>Curiosities and Game-Changing</u> <u>Innovations</u>). CRISPR is different than the rather controversial GMOs. Instead of adding foreign genes into an organism or manipulating them, CRISPR can eliminate or correct undesired genetic characteristics, similar to natural breeding—just <u>faster than the natural process</u>.

In addition to increasing resilience to climate change, CRISPR can be used to help crops grow in more places; reduce the need for pesticides, fertilizer, and water; and increase the shelf life of fruits and vegetables. Scientists are also experimenting with CRISPR as a means to change the genes of insects and pests that harm and destroy crops. While most of these experiments still happen in laboratories, the U.S. government has already approved the release of **CRISPR** mosquitoes in Florida and California. Other CRISPR insects will be piloted in greenhouses next.

BRINGING FOOD PRODUCTION CLOSER TO THE CONSUMERS.

Nearly 80 percent of all food produced globally is being consumed in urban areas, so it makes sense to bring food production <u>closer to cities</u>. While the concept of urban farming is not new, evolving approaches are gaining increased attention and technological innovations can help improve efficiency and sustainability. The global market for vertical farming (a version of urban farming where plants are stacked vertically and mostly indoors) is <u>anticipated to</u> grow by 26 percent annually and will reach \$42.5 billion by 2032. A pioneer in this field is Singapore, where the world's first commercial vertical farm opened in 2012, with its 30 by 30 initiative that aims to sustainably produce 30 percent of its population's nutritional needs by 2030.

The need to produce food locally has been acknowledged by the U.S. government as well. Since 2020, the USDA, through its Urban Agriculture and Innovation Production grants program, has granted \$47 million in funding for urban farming projects. The number of applications for these grants doubled between 2022 and 2023. reaching 300 applications.

Many technological innovations aim at making large-scale vertical farming a sustainable alternative to

conventional agriculture to feed the world's cities while having a smaller land, water, and (especially) energy footprint. This is not an easy task, considering the limited space and high energy consumption of these farms. Additionally, indoor vertical farms mainly grow high-value, quickto-harvest crops that don't require pollination, such as herbs and leafy greens. Innovation in robotics and All are trying to resolve this issue, along with other challenges of pests. water, and light controls. Boosting crops with electricity is another development that can be applied to indoor farms, conventional agriculture, and even zero-gravity environments in outer space.

Empty office buildings resulting from recent hybrid work trends provide new opportunities for potential urban farming spaces in dense urban environments. As we reimagine the future of downtowns in the post-pandemic new normal, this can include more complete neighborhoods with mixed uses and a variety of amenities-including fresh food production.



Lab-grown meat may soon be joined by lab-produced dairy, like Eden Brew's animal-free, precision-fermented milk under development in Australia. Photo courtesy Paper Moose/Eden Brew.

AGRICULTURE AND FARMING WITHOUT THE FARM. While moving agriculture from the countryside to the city and from horizontal to vertical might already sound like a radical shift, some scientists and industries are exploring how farming can be done without a farm at all. Previous Trend Reports have

reported on lab-made, synthetic meats and 3D-printed fish. Several brands of synthetic beef, chicken, and fish have now received approval in the U.S. and other countries. One company has even successfully created <u>a meatball</u> from an extinct mammoth.

LEARN AND WATCH

One driver of this trend is to find alternatives to unsustainable practices of the cattle industry, which accounts for anywhere from 11 to 17 percent of all global greenhouse gas emissions. However, uncertainties remain about the sustainability of synthetic meats, should they become mainstream. Current synthetic meat manufacturing is water- and energy-intensive, and mass production could potentially create more emissions than the conventional cattle industry. As with urban farming, the vertical and lab versions of agriculture still need to improve their energy and water footprints as well.

In these early days of synthetic meat production, it is not yet clear which way the market will go. Some say that we have already reached

peak vegan as sales for plant-based meats like Beyond Meat slump. Meanwhile, the Italian parliament voted to <u>ban lab-made meat</u> (including production, sale, and import) to protect its meat industry, food heritage, and the health of its citizens.

In addition to farming without a farm, precision fermentation might soon provide us with milk without the cow, which has the potential to significantly impact the future of the dairy industry. Other innovations on the horizon include regenerative ocean farming and farming in arctic zones or in the desert. Furthermore, as already mentioned in previous Trend Reports, scientists are exploring the possibility of growing plants in outer space. In 2023, NASA grew its first tomatoes at the international space station, and researchers are looking into growing crops on Mars. Last, but not least, one company is already generating protein out of air. This might be essential for longerterm space exploration in which space crews are travelling for many



Climate change is thawing massive areas of permafrost that will become available for different uses in the future, including about two million square miles in Siberia— an area equal to half of all U.S. farmland. Photo by Emile Ducke/*The New York Times*.

years, potentially producing their food from their own breath. (Bon appétit!)

Some of the concepts here may seem very utopian (or maybe dystopian), but whether we move farming into cities, make conventional agriculture more resilient, or shift our food production completely into labs and outer space, all of these developments will have land use and potential

transportation impacts. Growing demand in urban spaces for vertical farms will require planners to provide these spaces combined with the right mechanisms for sustainable practices. A decline in farmland might open up opportunities for land preservation, rewilding, or other needed actions. One thing to keep in mind is that with climate change, massive areas of land that are currently permafrost are thawing and will become available for different uses in the future. According to current estimates, this will include about two million square miles of permafrost in Siberia-an area equal to half of all U.S. farmland-by 2080. The spread of agriculture to currently uninhabited polar regions such as Antarctica, however, is <u>raising concerns</u> about repercussions to climate and the environment as well as infringement upon Indigenous rights. Whatever happens, planners should be watching these developments and understand when it's time to prepare for them and act.

The New Space



Recent years have seen a revival in space activities, with plans for Moon and Mars missions underway and space mining and manufacturing activity expanding. Illustration by NASA.

Recent years have seen a revival in space activities, as highlighted in the <u>2022</u> and <u>2023 Trend Reports</u>. The "new space" industry, fueled by advanced technologies and increased private investment, is reshaping our perception of space. The scene now involves collaborative efforts between NASA and private entities, with major companies such as SpaceX and Amazon playing key roles. This ecosystem, influenced by innovative business and funding strategies

from commercial sectors, promotes space accessibility and innovation. Plans for <u>Moon</u> and <u>Mars</u> missions are underway, and space mining and manufacturing are expanding. However, as space exploration's potential grows, so do its challenges and sustainability issues on Earth.

New opportunities in the space industry

While some believe NASA's role has diminished, it remains significantly influential. But NASA now funds and contracts with <u>the private sec-</u> <u>tor</u>, shifting much decision-making to entrepreneurs. This billionaire-backed progress is a significant change, and experts hope it continues, as the industry needs audacious innovators and financial resources.

The space industry has historically focused on low Earth orbit (LEO), home to communication satellites, the International Space Station, and the Hubble Telescope. Initial space tourism and space-based manufacturing will likely be in LEO, but interest is growing in <u>expanding</u>. activity to the Moon and beyond.

This emerging space industry is still vulnerable to global economic and security challenges. The competitive nature of space exploration raises safety concerns for the U.S., and its space companies are often foreign intelligence targets. For planners, the space industry demands specialized planning expertise and brings new job opportunities while emerging as an influential stakeholder in land use and strategic planning decisions around some U.S. communities.

A new Moon race

Entities from the U.S., Russia, India, Israel, and Japan have tried machine landings on the Moon's southern region over the years, with varying success. <u>Artemis III</u>, NASA's 2025 Moon project, plans to become humanity's lunar return after over half a century, with a <u>diverse crew</u> including the first woman and person of color. SpaceX, led by Elon Musk, has unveiled the <u>dearMoon</u> <u>Project</u> crew, though a lunar flyby



In September 2023, the OSIRIS-REx mission delivered an asteroid sample in a capsule to Earth that could shed light on the primordial conditions and materials that existed during the early days of our solar system. Photo courtesy of NASA.

by Yusaku Maezawa and a team of artists planned for 2023 was postponed.

Governments and private entities alike <u>are eyeing the Moon</u> not just for scientific exploration but also for potential industrial and commercial ventures, given the Moon's resources that might benefit Earth (helium-3, rare earth metals, and water). Upcoming Moon expeditions will use more robots and cutting-edge tech, aiming for eventual <u>colonization</u> and serving as a launchpad for deeper space exploration. Planners may start to pave the way for <u>off-Earth settlements</u>, which will require new outer-space planning paradigms.

Moreover, the Moon could soon be bustling—with no atmosphere but plenty of equipment-eroding dust. Scientists <u>suggest</u> using large lenses to melt this dust, creating stable roads and landing areas as a solution to these challenges.

Space-driven innovations

NASA is investing in a <u>variety of</u> <u>innovations</u> under the <u>NASA Inno-</u> <u>vative Advanced Concepts</u> program. One such initiative is exploring the potential of <u>using fungi</u> to "grow" habitats on the Moon, Mars, and other celestial bodies. Some of these ideas, like a lunar oxygen pipeline or a space-built telescope mirror, could revolutionize space exploration.

In September 2023, the OSIRIS-REx mission delivered an asteroid sample to Earth that could shed light on the primordial conditions and materials that existed during the early days of our solar system. The October 2023 launch of the Psyche mission is raising interest in space mining—the asteroid Psyche is rich in iron, nickel, gold, and platinum—though the feasibility of this new industry remains under scrutiny due to the high costs associated with space missions, potential commodity price crashes, and the unresolved matter of resource ownership in space. Nonetheless, accessing abundant space resources could revolutionize Earth's construction methods and potentially intensify urban development.

The development of space innovations also fosters collaboration on Earth. The creation of Pittsburgh's <u>Keystone Space and Defense Inno-</u> <u>vation District</u> highlights the transformative potential of the U.S. space industry. Such specialized districts can significantly bolster regional economies by acting as magnets for talent, innovation, and investment.



More space travel

No longer exclusive to astronauts or the ultra-rich, space travel seems to be becoming more accessible to the common individual. In 2023, <u>a mother-daughter duo</u> won free tickets on a Virgin Galactic tourist flight. However, the space travel industry's growth has lagged behind expectations, with <u>insur-</u> <u>ance complications</u> being a primary roadblock.

Of the objects currently being tracked in Earth orbit, shown here as computer-generated dots, only five percent are functional satellites; the remaining 95 percent is orbital debris. Image courtesy NASA ODPO.

On Earth, cities globally are capitalizing on space hype. Launch sites such as <u>Wenchang</u>, <u>China</u>, are becoming dual-purpose infrastructures: epicenters of scientific advancement and tourist attractions. But while these endeavors bolster the economy and foster national pride through space-themed tourism, they are not universally embraced. Case in point: residents of Boca Chica, Texas, mentioned in the <u>2023 Trend</u> <u>Report</u>, lament how <u>SpaceX has</u> <u>disrupted</u> their tranquil coastal existence. Such instances pose questions for urban planners and regulators about the integration of launch sites

into community landscapes and future plans.

Debris crisis

The integration of space technology into our daily lives and operations has been accompanied by the ever-increasing challenge of <u>space</u>

debris. For planners who rely on up-to-date satellite imagery for various projects, this issue is of concern. Mega-constellations like Starlink pose both an opportunity and a challenge. With thousands more satellites planned for launch by different players, the probability of collisions increases, endangering existing missions and satellites. A NASA report highlights the immediate need for effective remediation methods, which include removing small debris, altering the trajectories of larger objects to mitigate potential collisions, and implementing controlled reentry for reusable systems.

Furthermore, the Moon already holds a significant amount of <u>space</u> junk from our space expeditions. With every mission, more <u>human-</u> <u>made materials</u> find their way to its surface. As we expand our endeavors into space, it is imperative to take a responsible approach to exploration. Planners can help extend the principles of stewardship and sustainability beyond the Earth into human activities in space.
ChatGPT Talks About the Futures of Al



Illustration by Christian Blaze. Image concept generated by asking DALL-E to envision ChatGPT.

Al's next 30 years, its impact on industries, and the path to responsible development.

By ChatGPT 3.5 and ChatGPT 4 In considering the long-term prospects of AI, we decided to go right to the source. The large language model (LLM), the technology behind ChatGPT, appeared to be the ideal interviewee and interviewer to lead a discussion on this topic. To dive deeper into the implications of AI technology on the planning profession over the next decades, we simulated a unique discussion in which ChatGPT created and immediately answered its own questions.* The generated interview below explores opportunities AI presents for planners, the ethical challenges surrounding its deployment, and the potential role of AI in addressing challenges planners must tackle, such as climate change.

Welcome, ChatGPT. Today, we're going to delve into the future of AI. To start off, how do you see AI evolving in the next 20 to 30 years?

Thank you for having me. Over the next few decades, AI is likely to experience significant advancements in various areas. We can expect improvements in natural language understanding and generation, enabling more coherent and contextually relevant interactions. AI's ability to process and analyze vast amounts of data will continue to grow, leading to better insights for decision-making across industries.

That's fascinating. With these advancements, what sectors or industries do you think will be most impacted by Al's evolution?

Many industries stand to be transformed by AI. Sectors such as health care could benefit from Al-powered diagnostics and personalized treatment recommendations. Transportation might see optimized traffic management and the rise of autonomous vehicles. In manufacturing, Al-driven automation could revolutionize production processes. And of course, Al's influence on finance, entertainment, education, and even creative fields like art and music composition is expected to expand.

There's been a lot of talk about the ethical implications of AI. How should we, as a society, approach the challenges of AI ethics?

Addressing AI ethics requires a multipronged approach. First, transparency in AI decision-making processes is essential to understand and trust AI outputs. Second, researchers and developers need to actively reduce biases in datasets and algorithms. Third, there should be broad public engagement on

ChatGPT 3.5 and ChatGPT 4 versions of interview simulation.

*The Q&A text represents a mix of

defining Al's values and norms, ensuring diverse perspectives are considered. Lastly, regulatory and policy frameworks might be needed to guide Al's development and deployment in sensitive areas.

Let's switch gears a bit. How can Al contribute positively to global challenges, such as climate change or health care?

Al has the potential to be a game-changer in addressing global challenges. For climate change, Al can optimize renewable energy sources, model and predict environmental impacts, and assist in conservation efforts. The key is to deploy Al in ways that augment human capabilities and address specific problems while being mindful of unintended consequences.

Excellent points. Now, in the context of urban planning, how do you envision Al's role in shaping the future of cities?

Al is poised to play a pivotal role in urban planning. Smart cities, powered by Al and IoT

INSIGHT FROM OUR 'EXPERT'

"Al is poised to play a pivotal role in urban planning. Smart cities, powered by Al and IoT technologies, could revolutionize how we design, manage, and interact with urban environments. ...However, ensuring that these advancements are equitable, sustainable, and considerate of citizen input will be paramount."

technologies, could revolutionize how we design, manage, and interact with urban environments. Al can optimize traffic flow, enhance resource management, and enable predictive analytics for infrastructure planning. It can also facilitate community engagement, helping residents participate in decision-making processes. However, ensuring that these advancements are equitable, sustainable, and considerate of citizen input will be paramount. Thank you for that insight. One last question: What challenges do you foresee in realizing the full potential of AI over the next few decades?

Several challenges lie ahead. Technical challenges include developing AI systems that can truly understand and generate humanlike language, as well as addressing the limitations of current machine learning algorithms. Ethical challenges encompass issues of bias, accountability, and the potential misuse of AI technology. Balancing the benefits of AI with concerns about job displacement and social disruption will also require careful consideration.

The future of planning



Upskilling: Evolving Planning Competencies and Skills

PlanTech: Updating the Planner's Toolkit



Conclusion

Upskilling: Evolving Planning Competencies and Skills

This is the third year we have published a *Trend Report*, listing more than 100 trends and signals that are relevant to planning. And as we have emphasized throughout this report, though these are the latest developments and emerging topics for this year, most of the trends from previous *Trend Reports* are still relevant as well.

While this report shares knowledge about emerging topics and provides links to guiding resources on how to make sense of them, we also need to raise awareness about the "knowhow": the skills and competencies planners need to be able to tackle some of these emerging opportunities and challenges. Through this foresight work, APA has identified the need to provide skills trainings to <u>upskill planners</u> on current and future skills gaps related to emerging trends. Skills gaps we have identified in previous *Trend Reports* include planning for change and the need for agility, people-centric planning and related human skills, planning with foresight and the need to institutionalize imagination, and working across sectors in interdisciplinary collaborations, among others.

Together with our Trend Scouting Foresight Community, our PlanTech Advisory Community, and other APA member inputs, we have collected recommendations on how the planning profession needs to evolve so that planners can be successful in the future.

Planning with foresight



It is no surprise that one fundamental basis for tackling the current pace of change is to know how to make sense of the many trends and signals in this report and how to integrate our knowledge about them in the plans we

make for the futures of our communities. This is about using foresight as a method in planning to plan *with* the future (and not just *for* the future). For that, APA has created an interactive

online course, <u>Using the Future to Create Dynamic Plans</u>, that provides training on how to use this *Trend Report* and

- scan for trends and make sense of them;
- use <u>scenario planning</u> as a method to understand what plausible futures of a community might look like (in collaboration with <u>the Lincoln Institute</u>);
- integrate these plausible futures in our plans; and
- create dynamic plans that allow us to pivot and change directions while the future is approaching.

Additionally, *PAS QuickNotes* 94, "<u>Planning with Fore-</u> <u>sight</u>," summarizes what planning with foresight looks like. A PAS Report with more detailed guidance will be released this year.

Collaborating with technology



It can be challenging to keep up with the latest technological advancements, especially in the AI era we are now living in. And while some fear that AI may take their jobs, it seems more realistic that AI will take on certain tasks and

we will have to learn how to collaborate with it. Therefore, it will be imperative for planners to learn about these technologies and understand how applying them, and potentially collaborating with them, can make planning more efficient and potentially more people-centric. Planners can use technology to take care of many time-intensive, repetitive tasks, which will free up time for them to focus more on the people in our communities.

To assist planners in staying up to date with the latest AI-driven technologies, APA offers <u>Unleashing the Potential of</u> <u>ChatGPT in Planning Practice</u>, an online training that unpacks the implications of ChatGPT for planners, offers pragmatic guidance, and showcases real-world applications.

Another training centered on AI for image generation, <u>Unlocking the Secrets of Image Creation with Generative AI</u>, gives participants valuable insights and hands-on experience in how these technologies have the potential to advance planning practices.

Additional PlanTech trainings on topics such as city digital twins will follow this year.

Making people the center of our work



Many skills gaps related to human skills have been identified as well. The challenges discussed in <u>Political Polarization and Societal</u> <u>Division</u> result in increased conflict during community meetings and public engagement

processes. Equipping planners with conflict resolution skills has become crucial, and APA is offering a training series, beginning with <u>Mastering Conflict for Effective Planning: Navigation and</u> <u>Resolution</u>, to help them learn the skills they need.

Meanwhile, planners are trying to correct planning mistakes

from the past that have resulted in inequities and marginalization of many communities and implement new approaches to create equitable communities. To find the right path towards building trust and reengaging with these communities, the practice of empathy and compassion is imperative. Planners can engage with these vital methods through the online training <u>Empathy, Equity, and You: Stories, Skills, and Practices</u>.

Additional human skills upskilling trainings will be provided this year.

From innovation by crisis to innovation by culture

Coming out of the COVID-19 pandemic while still tackling the myriad other crises of today (climate crisis, health crisis, infrastructure crisis, etc.), one may argue that we have moved from "planning for progress" to "planning for crisis." However, our crisis mode during the pandemic has resulted in many innovative solutions no one would have thought of otherwise.

And when looking at the long list of emerging trends and the growing list of upskilling needs, it will be important to leverage this spirit of innovation not just for crisis prevention, but <u>as</u> <u>part of our work culture</u> as planners.

How was it possible to implement innovative ideas during the pandemic? What needs to change to continue innovating? To build a culture of innovation means to integrate innovation into day-to-day planning practice. This includes creating pathways and opportunities to imagine, co-create with the community, experiment, prototype, allow to fail, and iterate. APA's <u>Design Thinking Research KnowledgeBase Collection</u> offers planners guidance in applying this creative, agile approach to "wicked problems" and unprecedented situations, unexpected disruptions, and uncertain change.

A culture of innovation in planning that makes people the center of our work, uses foresight to prepare for uncertainty, and applies technology for everyone's benefit will have the power to sustainably resolve our current polycrisis and bring back "planning for progress" and the public good.

PlanTech: Updating the Planner's Toolkit

The pace of technology innovation is unstoppable, as the emerging trends and signals in this *Trend Report* show. This is also the case with <u>PlanTech</u>: technologies planners can use in their work to facilitate processes or make certain tasks more efficient.

Al tools for productivity

AI-based technologies are increasingly becoming essential components in planners' toolkits. Tools like <u>ChatGPT</u>, <u>Bard</u>, and <u>Grammarly</u> have already enhanced efficiency, freeing up time for hands-on community work. This trend towards automation of day-to-day work is just getting started. We are entering an era in which AI companions, such as those in <u>Zoom</u> that provide meeting summaries and transcripts, are becoming ubiquitous. These AI companions are expected to evolve into comprehensive tools that assist with creating documents, composing emails, filling out forms, <u>responding to RFPs</u>, and preparing grant applications. <u>ChatGPT Plus</u> can analyze large datasets quickly, read PDFs, and even generate images from text descriptions using the <u>DALL-E 3 integration</u>. Community members will likely soon expect planners to be skilled in using these advanced tools to maintain effective engagement.

Evolution of open data



Planners, who use a variety of spatial data sources, stand to gain from the advancements in open data platforms and open-source technologies. Meta's <u>Daylight Map Distribu-</u> <u>tion</u> of OpenStreetMap (OSM), along with

contributions from the <u>Overture Maps Foundation</u> in the form of points of interest, network, and building data, consolidates multiple data sources for use in planning applications. The Overture Maps Foundation aims to provide interoperable <u>open</u> <u>map data</u> that meets enterprise standards for those who need to develop map services. Planners' active contributions to the creation and maintenance of open-source datasets like OSM and AI-driven tools mark a new era of broader access to geospatial data. It is not only transforming professional planning but also empowering citizens, researchers, and activists, enabling them to contribute to and benefit from geospatial analyses.

No-code platforms



<u>No-code and low-code platforms</u> are innovative digital solutions that allow urban planners to carry out tasks without extensive coding knowledge or software development skills, or with only minimal scripting. These platforms

offer cost-effective options for producing a range of outputs, from reports to interactive applications, through easy-to-use interfaces. They simplify complex coding tasks, enabling users to leverage the full potential of the software without understanding a wide array of programming languages. This simplification is achieved through intuitive design, making essential tools such as word processors, emails, and mapping platforms accessible not only to computer scientists but also to planners.

There are plenty of platforms available that already support various aspects of urban planning practice, including <u>MailChimp</u> for email campaigns, Excel and <u>SmartSheets</u> for data analysis, <u>Unreal Engine</u> and <u>SketchUp</u> for 3D visualization, <u>Asana</u> for project management, and <u>Zapier</u> for workflow automation, among many others.

In addition to these general-purpose tools, myriad specialized tools on the market serve specific functions relevant to planning practice. These include ICLEI Clearpath, the EnergyStar Benchmarking platform, and RiskFactor Pro for municipal and asset-level greenhouse gas inventories and climate risk modeling; IMPLAN Cloud and REMI SEI for site suitability analysis and economic impact modeling; QGIS, Felt, Carto, and Esri's Enterprise solutions via ArcGIS Online and ArcGIS Pro for cartography and geospatial analysis; and even Google Earth Engine and Meshroom for reality capture drone footage and aerial imagery processing. These tools are continuously being refined and enhanced—most recently by way of integration with popular or proprietary large language models (LLMs), ideally creating efficiencies by allowing users to translate descriptions directly into desired output. In late 2023, OpenAI launched a no-code platform enabling the creation of custom ChatGPT versions for specific purposes, without any need for coding.

Reality capture



The advent of satellites, drones, and highspeed internet has greatly simplified the process of converting built and natural environments into 3D models. This advancement, known as <u>reality capture technology</u>, is

transforming the Architectural, Engineering, and Construction (AEC) sector by accelerating and streamlining the processes of analysis, design, and construction. Furthermore, these

technologies are becoming more user friendly, enabling communities to participate in the digitization of their environments. Applications such as <u>Polycam</u> and <u>RealityScan</u> empower individuals to create 3D models using just a smartphone or tablet camera. <u>RealityCapture</u> allows the creation of highly realistic models from photographs and laser scans. <u>DroneDeploy</u> leverages aerial imagery for mapping and analysis. These examples are part of a growing trend, with numerous startups striving to make such technologies more accessible. As these tools become more affordable, they herald a new standard in creating "as-builts"—detailed representations of existing conditions. Combined with model-based design technologies, they have the potential to significantly expedite and reduce the costs associated with urban and architectural design.

Remote tools for civic engagement



Public expectations regarding engagement with local government have significantly risen over the past decade. Planning departments are now tasked with fulfilling these demands to ensure that all community members who

wish to participate have the opportunity to do so. Planners are expected to forge a partnership with the public, moving beyond the traditional method of in-person meetings, which can inadvertently silence many voices.

The push for digital participation has accelerated due to COVID-19, leading to the adoption of various advanced and specialized tools beyond standard video conferencing plat-forms like Zoom. One such tool is <u>Map Social</u>, which allows planners to gather community input on spatial matters through

an interactive remote platform. The emergence of AI-powered tools is also reshaping how planners and authorities communicate with community members. For instance, New York City has introduced the <u>MyCity Business Services chatbot</u> in a beta version to assist residents with inquiries about starting or managing their businesses. Another <u>chatbot prototype</u>, developed using the city of Denver's open planning documents, was able to answer a wide variety of questions regarding various local regulations. Despite these innovations, concerns regarding the trustworthiness and quality of engagement through AI remain. These technologies will need time to demonstrate their effectiveness and earn the confidence of the public.

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Conclusion

Every year when we start working on the next *Trend Report* (which is usually the day after the current report was published), we wonder if we will be able to find enough trends and signals, sufficient new content that will fill up an entire report. And every year when we get to the point of prioritizing which of the newly identified trends and signals will go into the *Trend Report*, we struggle because of the flood of new topics. This is a signal itself, portraying the fast pace of change around us. It is also a signal that planners are tackling ever more change and related challenges in their communities, and that it is becoming ever more complex to identify the opportunities among these changes. This is why we publish this report annually.

And while most trends and signals from previous reports are still relevant, we use these annual *Trend Reports* to highlight what's new, what's specifically relevant in the coming year, and what are some emerging topics planners should be learning about.

It's a process of learning with the future that will help planners prepare for the many uncertainties on the horizon.

While the main themes and bigger-picture topics remain similar each year (e.g., climate change, artificial intelligence, housing, health, transportation, etc.), within all of them we can see myriad shifts that are outside of our control yet directly or indirectly impact the work we as planners do. A local economy might be suffering from global economic warfare. Technological advances introduce new transportation systems into our communities and affect how people move around. Lack of political will and the inability to make decisions in a polarized world can result in a worsening climate.

Today, knowing about these external drivers of change, understanding how they may impact our communities and the work we do, and preparing for and proactively including them in our plans for the future of our communities is more important than ever before.

APA and the Lincoln Institute will continue sharing emerging trends and potential future trends that we see as relevant to the future of the planning profession. And we will continue providing you with the right guidance, knowledge, and successful practices so you can tackle the challenges and seize potential opportunities of today and tomorrow.