



We are no longer looking at a distant landscape; we are walking through it. A fringe perspective only a decade ago, the terrain of artificial intelligence is now all around us, affecting everything we do and our potential paths in the future.

As urbanists, we regularly read about or participate in breathless debates about AI in general (e.g. *'Will AI destroy friendship?'*) But we also want to dig in a bit, focusing more granularly on AI's applications to cities and how we will be engaging with AI as practitioners. **@UrbanOvation** and **@billkistler** offered a productive on-line platform for our workshop, and I was pleased to moderate a great discussion with some specialists.

As a group, we tried to address a number of questions, including how AI will transform the way we design, live, work, and shop in cities; emerging innovations in our workflow, and related implications for cities and real-estate. - CHRIS CHOA

Derek, Founder and CEO of Synergetic, a sustainability analytics company focused on application of data science and AI in urban planning and design. Derek took the initiative of defining the differences between predictive and generative characteristics. Predictive AI tools have been around for a relatively long time, with their own strengths and limitations. In city making, the predictive models allow us to leverage urban data and IOT inputs. We can use AI to understand and test urban initiatives at scale before making major capital expenditures or changes in governance. Generative AI, with its human to machine interface, is the emerging creative capability that allows us to move beyond understanding operational issues and consider pre-construction effects – no longer being constrained by IOT-generated information.

Caro, in her work as data science and strategy lead for ARUP, adoption of predictive AI is especially useful in combination with traditional operations to solve increasingly complex challenges related to sustainability and balancing opportunities between local economies. From a cities perspective, planners sometimes struggle to understand if actions correlate with a result. A digital twins that integrate predictive AI is especially useful working backwards from intended outcomes. This is especially important to help craft sustainability legislation, for example.

Dave, Chief Value Officer at Cohesive Group Innovative projects, has the service integrator and client's perspective. He noted that sometimes urban professionals get caught up in the shiny technology and lose sight of the need to realise value for communities. Most organizations own

multiple assets and seek digital integration across large portfolios that could include everything from new buildings to 600-year-old historic assets. Clients increasingly have many parallel digital twins; as examples - for utilities, for urban fabric, even for biophilia. He noted the generational progression in how data is being used. Earlier analogue and digital operations were deterministic. Now, with game engines, decisions are made in real time and are more predictive; we're not just thinking about the built assets anymore but anticipating the societal outcomes the assets can achieve.

Gavin, co-founder and CEO at CityDetect is an entrepreneur with a background in start-up law. His company retrofits existing assets and fleet vehicles with cameras and then uses computer vision augmented by AI to identify various forms of infrastructure decay and urban blight. He works with housing authorities, and nonprofits like Habitat for Humanity to direct resources to lower income areas. The large increase in AI allows city agencies to maximise the reach and capabilities of their workforce, for example to proactively anticipate problems and complaints. It allows them to send out large numbers of citations with educational value, for example informing building owners that they are not only decreasing their own property values but those of their neighbours as well. When escalating citations lead to fines, code enforcement agencies have offered to share a percentage of collections with the company. A recent challenge is avoiding perverse incentives that distort the development of the company's capabilities (e.g. focus on the largest bad actors vs. find as many issues on each property as possible).

Roelof is a long-term tech investor and founder CogNovum which builds and operates edge data centres for AI tenants. Roelof rounded out the initial discussion and spoke about the relationship between data and energy capacity. He noted the emergence of two new data centre types – the spines for AI - which in turn have impacts on the city. Training data centres can be relatively stand-alone; while they are building algorithms, they don't need to be near major population centres. They absorb vast amounts of data and they consume prodigious amounts of energy. This typology is generally air-cooled and they tend to propagate in relatively remote places with relatively cooler environments and low energy costs like Iceland, Norway, Northern Canada. Inference data centres, on the other hand, need to be geographically close to the end users, well-connected to the fibre network to reduce latency. They tend to be liquid-cooled, to reduce area requirements and lower energy costs. AI is going to be everywhere, and its physical manifestation will be the integration of data centres into regular urban buildings.

We opened the brisk conversation to other motivated participants on the call and began to address some related issues including partnerships, workforce transitions and unintended consequences. Within a short amount of time, there was an emerging consensus around several issues. My admittedly editorialised summary of the discussion includes:

Define the outcome first.

We reflexively seek to start with the technical application. We need to shift the mindset and define the problems we are trying to solve, then consider the data sets that are relevant to the problem.

Build partnerships.

As urban development leaders, at least in the short to medium term, we realise the greatest value from AI when we find the right technical partners. Broadly speaking, these groups include:

- Large-scale cloud organizations, (like AWS, Bentley, IBM) to augment our data sources.
- Specialist organization, to deepen our domain capabilities.
- Digital native organizations (including start-ups), to augment our resource pools.

Value expertise.

We will still need specialised human perspectives to understand and address risks in the built environment. We are going to have new types of jobs, and we will readily adapt to them. New challenges will be solved by AI-augmented people in new roles, but we will continue to rely on specialised expertise and domain experience to make human-to-machine interfaces like ChatGPT trustworthy. (As @Caro points out: ‘We wouldn’t let a graduate engineer design a bridge. Why would we let a graduate data scientist design the algorithm?’) We will continue to shift our education from schools and universities to apprenticeships and training programs.

Keep your perspective.

Generative AI (like large language models, imagery engines) are not transformative on their own, but they do accelerate the adoption of the predictive AI capabilities that are truly transformative. As @antony slumbers points out, we are applying new tech onto existing systems. We are in an age that is like electrification after the onset of steam engines; it took 40 years before steam-driven factories were redesigned to take advantage of distributed sources of energy.

Prepare to migrate.

Like earlier waves of Industrial Revolution, which induced massive rural-to-urban migration, our settlement and movement between and within cities will change. AI-enabled tech gives us more choices – we reconsider where and how we work, and what else we seek around us. User demand for entire asset classes will be radically reduced (for example: 50% of traditional offices will disappear.) @joshua page is concerned about the rapid repositioning of the high-street, with tech innovations outpacing the planning policies that govern the urban environment. Many ‘white-collar’ jobs will disappear within 10 years. Our employment commitments will change. We will be living and working in different places. And as we repurpose ourselves, we will find new places where we can find mentors, meet colleagues, develop trust, and trade. And as AI-accelerated tech allows us to be move mobile and chose where we live and work more easily, our cities will gradually turn themselves into consumer products – ‘lifestyle as a service’.

Build new infrastructure.

Infrastructure is destiny. As the virtual infrastructure of predictive digital twins become more powerful, they will become even better at anticipating and allocating the value of physical infrastructure, and related investment that will follow. (Capital markets: take note.) Building-integrated edge (inference) data centres in central city locations will become necessary and ubiquitous. New sources of electrical energy (conventional and renewable) are critical; power supply will begin to emerge as a major constraint to the propagation of AI.

Change lifestyles.

The increasing predictive capabilities of digital twins requires us to change our lifestyles. Their insights will increasingly encourage us re-allocate our time, investment capital, and operating resources. Organizations will seek these insights, and they will also need change management to govern themselves in unfamiliar ways - new lifestyles for institutions.

Share your data.

Data is the lifeblood of AI algorithms. The biggest barrier for AI startups is lack of data; without the data to train on, AI is unreliable and counterproductive. Create incentives for start-ups to partner with you by sharing your data (and domain expertise) with them. Like @Arup, develop synthetic data sets and sandboxes for testing and experimentation. Look at how students are using AI in the design of the built environment. @ruxandra shared an interesting link: [Artificial Intelligence in Contemporary Design Praxis \(yumpu.com\)](https://www.yumpu.com/en/document/view/11111111/artificial-intelligence-in-contemporary-design-praxis)

Consider unintended consequences.

We are generally obsessed with efficiency; using predictive AI to identify deficiencies in urban infrastructure, buildings operations, etc. will inevitably reduce ‘bottlenecks’ and friction that we have become accustomed to in our personal and professional lives. Gamification of digital twins will make democratise and magnify its potentials, but do these new capabilities induce new challenges? For example, If we can now easily anticipate defects certain real assets might be facing, do these properties suddenly become un-insurable? Do we need to start moving people out of housing that we thought was fine? Early adopters of AI-enhanced tech will have outsized influence on urban systems – are we ready for this?

Last thoughts.

I came away from our session generally optimistic about the growing potentials of AI. (For example, predictive AI makes it easier to understand how many discrete parts of cities interact with each other. With digital twins, we can backwards-test a previous decision to determine how it performed, etc.) These capabilities in turn suggest new ways of reconciling objectives and risks of people who invest in systems, people who pay for systems, and those who benefit from the investment and payments of others. But the discussion also made me think more about unintended consequences. The real-estate industry is notoriously opaque – for a reason; its glacial rate of change allows people who invest in real estate to create scarcity over time, which in turn creates investment value. And if predictive AI allows us to constantly recalculate value in real-time, will this capability undermine a fundamental value creation mechanism for real estate?

As humans, we may not have evolved in ways that will allow us to absorb information at the rate is starting to come at us. (And this goes for the impacts of AI-powered news, social media, and politics as well...) Our institutions are built to curate and absorb new information of longer periods of time. Our world view is analogue – we think about potentials relative to others – not digital. And I wonder if digital processes create false precision?

We are starting to believe that AI-enhanced technology will be like a modern Prometheus, accelerating our journey, capable of transforming anything and everything at will, the titan fore-thinker that will free us from traditional sources of authority. But we might also consider the value of waiting, valuing our expertise, building partnerships, and letting opportunities present themselves first.

Perhaps the biggest changes AI will have on our cities won’t be physical or economic; they will drive us to renegotiate our status in society, and how we will relate to each other.

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NOTES

You can get the ‘read.ai’ transcript of the full discussion [here](#).

If you are interested in joining future discussions about this or other @urbanOvation issues, please contact wk@urban-ovation.com.



CHRIS CHOA /OUTCOMIST / Founder and Director

Chris leads complex urban projects, assembles extraordinary teams, builds consensus, and creates comparative advantages for public and private stakeholders. OUTCOMIST strategies work backwards from long-term virtues to identify outcomes and actions. He is an active board member for real-estate organizations, urban mobility, energy, and digital arts. Previously, he led AECOM’s Cities Consulting 0.25 pt practice and was an advisor to the Mayor of London.



DEREK WILSON/ SYNERGETIC

Founder and CEO of Synergetic, sustainability analytics company focused on application of data science and AI in urban planning and design. Former Head of Sustainability at TfL: metric-driven framework established ranking TfL’s GRESB ranking as most the most sustainable diversified property developer in Europe. Trustee of UK Green Building Council, Chair ULI/UK Sustainable Development Council, Chair of Green Finance Institute’s Green Lease Committee.



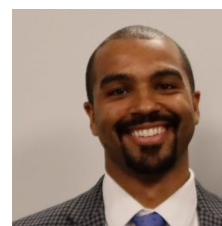
CARO AMES / ARUP / Data Science Strategy Lead

Developing data science capabilities required to adapt to the rapidly evolving environments. Background spans the design and delivery of bespoke data and data science business strategies, products, and capability building programmes for organisations across the built environment. Caro joined Arup from Faculty, one of Europe’s leading applied AI companies, where she was the delivery lead for their built environment practise.



DAVE PHILP / COHESIVE GROUP / Chief Value Officer

Systems integration, digital change strategies and digital asset management across the globe. Seconded in the UK Cabinet Office in 2011 as Head of BIM Implementation and has been a key contributor to the UK public sector BIM mandate (GCS 2011-2016) he was also Chair of the Scottish BIM Delivery Group through the Scottish Futures Trust delivering the BIM requirements of the Scottish Government.



GAVIN BAUM-BLAKE / CITY DETECT FOUNDER AND CEO

US army veteran and entrepreneur with a background in startup law. City Detect automatically assesses the exterior condition of every house throughout a city using mounted cameras and AI. The platform empowers non-profits and local governments by mapping property degradation and blight throughout communities, efficiently point resources to homeowners and neighborhoods.



ROELOF OPPERMAN / COGNOVUM

Roelof Opperman is Founder & CEO of CogNovum, a company building and operating sustainable immersion cooled Edge Data Centres for AI tenants. Roelof is former Partner and Head of Fifth Wall Europe, where he raised and led the firm’s inaugural Europe Real Estate Technology Fund. His investments include Lyric, Eden, Appear Here, Hippo (NYSE: HIPO), Industrious, Loggi, Recharge, Lime, Aurora Solar, Klikalia, Gorillas, and Huspy.

GENERAL DEFINITIONS

MACHINE LEARNING

Machine learning is when computers use experience to improve their performance

DEEP LEARNING

System imitates human brain works to learn things it never trained for.

Pioneered 2010-2015 by [DeepMind](#)

NEURAL NETWORKS

Neurons strengthen their connections as they exchange information, enabling learning.

NARROW AI

Systems that only complete specific tasks, such as automotive driving or image recognition.

ARTIFICIAL GENERAL INTELLIGENCE

System able to perform any intellectual task that a human can.

GPT-4 early (yet still incomplete) version of an AGI system

SUPERINTELLIGENCE

Exceeds cognitive performance of humans in virtually all domains of interest.

[Superintelligence: Paths, Dangers, Strategies](#) (Nick Bostrom)

ALIGNMENT

Systems goals that match human values, in order to reduce risk of harm us

e.g. ensuring chatbots do not engage in harmful content.

SINGULARITY

Hypothetical time when technology advanced to point where it is uncontrollable and irreversible.

Rapid, exponential, self-perpetuating advancements, difficult to comprehend, usurping humans

GENERATIVE AI

Systems create content, including images, text, videos, music, voice audio and code.

Trained on big data and machine learning to extrapolate to produce new data.

[DALL-E 2](#), [Midjourney](#) and [Stable Diffusion](#)

[OpenAI's ChatGPT](#) and [Google's Bard](#) are also forms of generative AI.

LARGE LANGUAGE MODELS

Systems trained on quantities of data to become very good at recognising language patterns

HALLUCINATIONS

Tendency to generate casual and convincing mistruths

TEN AI COMPANIES FOR ARCHITECTS AND DESIGNERS (From DEZEEN)

AI startups focused on the built environment have raised \$12.3 billion in funding in the last three years.

LOOKX

AI tool trained specifically for architects (English version of Xkool)
Dezeen recently interviewed LookX co-founder and CEO Wanyu He.

3DGURU

"AI interior designer"/ chatbot suggest floorplan for space based on a photo.

MIDJOURNEY

Convincing renderings of imaginary projects, recently able to fabricate plans and sections.

ADOBE FIREFLY

Companion for graphic designers, trained on Adobe's own library of stock images.
Less susceptible to claims of intellectual property infringement.

HYPAR

"text-to-BIM", designed to work alongside Revit, Rhino and Grasshopper.

DELVE

Generates options for urban developments based on criteria including budget, size and site constraints.
Ranking by priorities achieved. Also provides information on daylight each resi unit would receive.

AUTODESK FORMA

Competitor of Hypar and Delve.

FINCH 3D

Generate and edit floorplans optimised to a range of criteria, including CO2 efficiency.

SWAPP

Construction document creator.

SPACIO

"All-in-one tool for designing buildings" that can be used in a web browser.
Floorplans/digital sketches, simulations on daylight, noise, wind and stormwater in a matter of clicks.

FROM RUXANDRA

Artificial Intelligence in Contemporary Design Praxis (yumpu.com)