On Gizmos, Gadgets, Objects and Data

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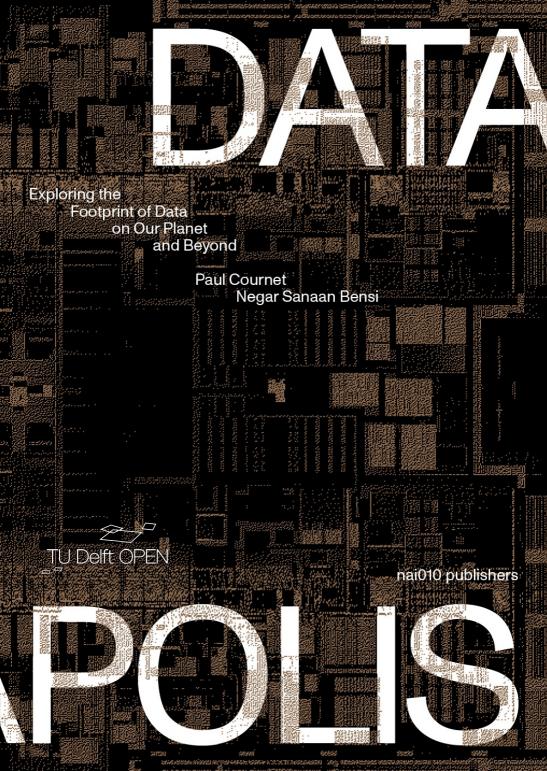Final published version
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DATA

Exploring the
Footprint of Data
on Our Planet
and Beyond

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POLIS

ON GIZMOS, GADGETS, OBJECTS AND DATA
Kees Kaan

The curators of this wonderful publication asked me to reflect on the gizmo catalogue, a fantastic section of the book. It features a range of objects, from astronaut suits and spacecrafts to pens and printers, beautifully drawn in scales 1:200, 1:200 or 1:20, and 1:2, with top and side views. Any reflection on data, AI, new technology versus proven technology, or the transition from analogue to digital generally raises more questions than answers. My contribution to this book does the same.

Datapolis investigates the data revolution's impact on humans and our physical environment. What is the effect of the ostensibly ephemeral cloud that hosts the virtual world? How does it influence our habits, behaviour and the things we surround ourselves with?

We have built an immense physical infrastructure, apparently invisible, hiding in the countryside, oceans and desolate places, to perpetuate the myth of people and things being wirelessly connected. *Datapolis* unmasks the cloud and exposes its physical impact. City and countryside are changing due to the disruptive effect of the 'delivery society' we are creating, whether it concerns bringing food, clothing, energy or ideas to our homes. Every wish is fulfilled at the touch of a button. But at what cost? How does this translate into a design brief or building requirements? What will be radically different in future buildings, and what will stay the same?

Simply put, what is the physical impact of data? This question is critical to architecture, a slow profession by nature. Buildings facilitate societal change and reflect them once they have already been crystallized. Architecture is a result rather than a driver of change, consolidating instead of initiating it. This means that we are now gazing at the immense complexes that the new technology sector generates. As the semiconductor is reduced to the nanoscale, getting smaller and smaller, data centres, production facilities, offices and warehouses produce giant structures devoid of people.

Datapolis's catalogue of gizmos is an overview of instruments, tools, means of transport or communication. These objects are time-bound and testify to human ambitions and expectations. They tell the story of the birth and rise of the new tech era, witnessing the innocence of the first computer and spacecraft to the swell of the current wave of change. They are also designed objects.

Museums worldwide exhibit artefacts related to food, work, war and domesticity that tell us something about the culture that produced and used them. We are interested in stuff that helps us understand our culture and, ultimately ourselves. Coins, jugs, tools, weapons and works of art are silent witnesses of humanity.

Humans surround themselves with objects. We find them in the layers of soil, but also orbiting the globe. The gizmos are a vestige of our development, and that wave swells exponentially. The objects we make are designed not just around our bodies, but for abstract activities, including required furniture, equipment and tools. Humans stay more or less the same in their basic needs and requirements, physical proportions, strength and weaknesses; the change is evolutionary and slow. But as the performance level of buildings towards the body rises, demanding higher comfort, safety and wellbeing, the gizmos change much quicker. Our buildings and cities transform while our bodies stay the same.

Not only do people surround themselves with stuff, they also drag it into their buildings. A functional office is a building where you can set up desks and chairs or distribute conference tables properly. A functional building is not just made according to the human body, but according to the logic of the tools it uses and all its surrounding processes and requirements.

The new connected world causes a considerable shift in those work and life processes and the gizmos that come with it. Today's body has acquired a set of personal tools. Processes and tools are increasingly pointing towards the self and the I. Steve Jobs saw it clearly—gizmos must become personalized tools merged with our identity. Maybe this is a first step towards integrating the body with the gizmo. The I-tool is a step towards the cyborg.

To optimally facilitate the workings of those small personal gadgets, the tech sector is building ample facilities in rural and industrial areas and hiding infrastructure in oceans and space. The freedom of the influencer in the city is facilitated by giant complexes in the hinterland, -sea and -space. There is an unstoppable simultaneous process of shrinking to nanotools and growing to megacomplexes. Both are subject to permanent innovation and either scaling up or downsizing radically.

Architects keep their eyes on the scale of 20 to 200, and the in-between where we try to maintain our precious cities and rural areas because that is where we live. It is our habitat that these new giants should not invade. The middle scale (normal buildings) is still developing in a noncommittal formalism. Exciting, iconic buildings, which are actually immensely boring non-exciting inventions, must disguise the fact that mid-scale development lags behind the two extremes. At this level, the radical urgency that characterizes new tech infrastructures has so far been lacking, or people are obsessively holding on to what they have because it's their core habitat, a place of comfort and joy—it is a gigantic dichotomy that is becoming a real issue.

Meanwhile, the city as we are used to it is gradually becoming untenable. The comfort and joy are not sustainable, the energy is inefficient, the waste is piling up and the food production is out of balance. There is a crisis because the city and the hinterland, mutually dependent, are out of balance.

Here we are, working and living in high-density areas, in buildings overcrowded with bodies and mobile devices served from empty buildings elsewhere buzzing with installations. We were able to manage the pandemic thanks to these virtual connections facilitated from those large empty buildings. We could largely continue our societal necessities, despite the personal physical isolation that the lockdown forced on us.

Is this a step towards a metaverse that will generally give some relief to the physical world? *Datapolis* does not yet indicate a development in that direction; the people's physical world and the footprint created are still expanding. But our built environment is our daily habitat. It is shaped by people over time and continuously changes and updates through complex processes driven by societal, economic, political and technical forces. In this setup, the role of design is crucial. Keeping in mind the best interest of society and human life, one could assume that if more accurate, complete and unbiased information is available in this ongoing process, our ability to shape our habitat will be better too. If this assumption is correct, then open data—impartial and fair—is essential.

This was my answer when Georg Vrachliotis invited me to The New Open conference on 27 and 28 October 2022. Tech is causing unmanageable, potentially ruinous disruptions and scale wrinkles in the built environment, but now we must also assume that it will help us fix those problems? Is the very industrial complex that is magnifying the problems also the key to solving them?

That is why I have added: 'If this assumption is correct.' The next step could be that the built environment gradually becomes more interactive, anticipating and performative. This performative environment, with its inhabitants, humans or other forms of life in all their diversities, might constitute a new cyber intelligence. Sounds like science fiction.

When it comes to design, we are guided by our values. They are in a permanent state of change while we, as a society, try to figure out what works and what needs to be updated. This means that design is evolutionary, but if so—do we also keep making the same mistakes?

Is knowledge built upon big data a guarantee for better solutions for real-world problems, or could it also generate huge collective mistakes?

While I'm thinking about the gizmos in this book, an e-invitation to participate in the event of Communities of Tacit Knowledge drops in my mailbox. The community investigates Architecture and Its Ways of Knowing and is organizing an exhibition and debate on the Object. They're asking me to choose an object that, for me, exemplifies the way tacit knowledge operates in architecture. Tacit is such an abstract concept.

Bringing it to the surface and making it visible and tangible through objects could be a method to understand architecture better and find out where specific knowledge is hiding.

I wonder if tacit knowledge might be the opposite of artificial intelligence. Or are they just different forms of knowledge? Tacit knowledge is unspoken knowledge that allows us to do or know things without understanding why and how we got that ability. Kind of like riding a bicycle.

Artificial intelligence is the man-made ability of machines to learn and apply knowledge. Would a machine be able to deploy tacit knowledge? Can the machine do or know something without first knowing the why and how?

This is a question for one of our AI scientists, so I decided to talk to Seyran Khademi, the director of the AI lab in our department. It seemed only fitting to do it through a gizmo in WhatsApp.

KK   Do you think a machine can develop tacit knowledge?
SK   I think the challenge with tacit knowledge is transferring it to other humans. So even if a machine could generate it, I would not know how to visualize/represent it, so basically, how to show it.
KK   Well, I understood that it is knowledge or ability that we cannot trace back to its origin; we cannot explain precisely how it works, like riding a bike.
SK   That is exactly how AI learns from data, but I doubt it can transfer tacit knowledge to explicit knowledge. AI learns from data because we cannot explicitly program computers to do complex tasks like vision (or riding a bike) :)

She says that computer scientists don't know how to write a program to make a computer visually recognize a cat just by seeing it. They can repeatedly show a million or more images of a cat to the machine. The machine will, from now on, recognize a cat by comparing the data. Next, the machine cannot recognize a dog and needs to see a million images of dogs. That doesn't sound very 'intelligent', does it?

It brings me back to the question. If we knew all there is to know, if all existing human knowledge built up over thousands of years would be broken down into data and become accessible for AI, would it prevent us from making the same eternal mistakes?

KK   then you are saying that AI is a form of tacit knowledge.
SK   I would say tacit information. The knowledge still needs to be extracted.

Then I bring it forward—the big question:

KK   Do you think AI could also lead to big collective mistakes because it uses data that was implicitly extracted from human errors, tacit mistakes?
SK   that is a very hot research topic.
SK   for sure, it can magnify our mistakes for the worse.
KK   so many scientists are on this topic
SK   yes.

A couple of days later I ask Seyran permission to use the conversation for this contribution to *Datapolis*. So, I send her the complete written text above.

SK   Also, there is a question the interviewer asks I suppose, and I quote: 'She says that computer scientists don't know how to write a program to make a computer visually recognize a cat just by seeing it. They can repeatedly show a million or more images of a cat to the machine. The machine will, from now on, recognize a cat by comparing the data. Next, the machine cannot recognize a dog and needs to see a million images of dogs. That doesn't sound very 'intelligent', does it?"

The answer is: What do you consider intelligence? If we assume that humans are intelligent then this is how our brain learns. If a kid did not see a dog before, she would not recognize it. We as intelligent species learn to perceive our world using our biological sensors, modern AI borrows the same process, however, AI 'perceives' the digital world abstracted in the data.

Call me if you have any other questions. So, I did call her by mail.

KK   Great Seyran, I will work it in the text. Of course, humans must also learn everything piece by piece, bit by bit, but do children learn quicker (with fewer examples) than machines or do machines also more quickly learn quicker the dog after having learned the cat?

KK   sorry for bothering you with these questions...

SK   My favourite questions :)

Yes that is true and our machines are still an infant in that sense, the human brain is able to do multitask learning, e.g., knowing German makes it easier to learn Dutch. Also, we are better at generalizing unseen examples, seeing a dog for the first time, a kid can categorize it as an animal or even a pet.

Many researchers are also working on multitask learning in AI, inspired by how our brain works again by learning from data (data-driven) rather than explicit algorithms (knowledge-driven). However, machines are scalable in terms of processing power so analysing lots of data, unlike the human brain, which has not changed much in thousand years.

Epilogue

This conversation opens so many doors to new questions. The new AI program that was initiated by Delft University of Technology is very exciting. I feel privileged to be able to work with all these brains.

Today we need to cope with a lot of information while designing, and if we want it to be state of the art, pure humanistic design talent is no longer enough. Of course experience is important, but we need to access new layers of information/knowledge simultaneously. We might come closer to the actual concept

of a 'knowledge of everything' by connecting many brains to generate a new collective knowing. Connecting brains requires ultra-clear lines of communication and exchange of information. I have a hunch that new technologies, big data and AI are based on universal templates. Using those could prove beneficial to this improved communication and collaboration of brains. Design research collaboration between practitioners and academics could establish new models of collecting information and designing.

If humans have a future on this planet, we need to change how we deal with our built environment; we cannot continue to rely on the interventions of individual geniuses. We need a collective effort and all the knowledge in the world to achieve higher standards and better results.

We must change our way of working as architects, not our way of being architects.

Glossary

Gizmo	A gadget, especially one whose real name and use has been forgotten. It's a weird kind of gadget.
Gadget	A small technological or mechanical object, innovative and appealing, a wanna-have.
Object	A material thing that can be seen and touched. A person to whom a certain action is specified.
Design object	An expressed solution to a real-world problem.
Ready-made	A mass-produced object displayed as a work of art.
Objective	A concept of truth independent from individual subjectivity. Without need for interpretation.
Subject	A thing or person being discussed or described
Subjective	Based on or influenced by.
Tacit	Understood or implied without being stated.
Implicit	Suggested but not directly expressed.
Explicit	Stated clearly and in detail, leaving no room for doubt.
Symbolic	Implicitly referring to another thing.
Specific	Something peculiarly adapted.
Generic	Related to a characteristic of a whole group.
Intelligence	The ability to learn and apply knowledge.
Artificial	Made by humans.
Stuff	Miscellaneous objects with possessive personal effects.

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