

# Google Campus One, Driverless Vehicles, and the Ethics of Systems Spaces

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**The increasing presence of digital technologies in the design, fabrication, and the day-to-day function of buildings themselves has led to an increasingly close relationship between architects, programmers, and hardware engineers. This balance of the relationship seems to tilt ever towards more scope for the digital developers, whose appetite for increasing influence appears to be without limit. It is necessary to question the extent to which architects are partners or passengers in the spatial goals of companies such as Google, who are branching into the built environment through a variety of innovations. Furthermore, this paper will demonstrate how the design of systemic instruments results in the encapsulation ethical positions. Through case study examination of the practices of Google, including its generalized business model and emerging inventions, this paper contextualizes and speculates on the shifting value and values of the spatial designer in the current epoch.**

## ARCHITECTURAL VALUES

Today architects are joined in the professional ranks by “software architects”, “information architects”, and “system architects”. Not only in name, high-tech professions are flooding into territory traditionally held by the architectural profession. Increasingly fantastical toolsets such as additive manufacturing and robotics are revolutionizing construction, and simultaneously steering significant control over production towards software programmers and hardware engineers. Emerging sensor based technologies promise adaptive environments and increased building automation further obscure the traditional producer/consumer hierarchy upon which the architect’s role has been precariously balanced.

At the corporate scale, the oligarchs of the virtual world, the victors of the post-internet economy, are vying for position in the brick-and-mortar world with new products and fields of research. Smart phones were just the first wave. Wearables, home assistants, robotics, and autonomous vehicles are some of the instruments that allow tech companies such as Google to reach out of the cloud and into the everyday, spatialized, meat-world, bringing with them models of production from the virtual. The embedding of so-called “smart” technologies in everyday objects is beginning to entangle living spaces with the datascape. In doing so, these companies’ business models, interests, and value systems have the capacity to radically alter both the methods and means of production of the occupiable realm; thus, it is appropriate to scrutinize these developments in the context of ethics.

## “SMART”

In 2014 Rem Koolhaas addressed the European Commission’s High Level Group meeting on Smart Cities and expressed concern over the trend.<sup>1</sup> The Smart City: a catchphrase that had come to represent the seemingly inevitable future of sensorially augmented cities - and by extension, buildings - that gather information from their environment and alter their functions to adapt, according to algorithmic rules. Koolhaas challenged: “how do smart cities offer any improvement?”, adding concerns over increased surveillance, centralized autocracy, the relinquishment of values (“liberty, equality, and fraternity [for] comfort, security, and sustainability”) and the loss of privacy.

Many of the same concerns about the smart city have also been levelled at Big Data companies, including Google. The increasingly ubiquitous acquisition of data on every practice of life, through embedded computing and mobile devices, provides such organizations with a prescience that is the envy of global governments. Koolhaas’ mistrust of technologies, especially digitally enhanced spaces, that data-gather might be read as impotent protest of a profession under siege, attempting to defend itself, but it can also be read as a move to strike an ethical position in a field typically driven by hunger for perpetually more information and more control.

Koolhaas further questioned the ability and credentials of tech companies to contribute to the making of meaningful spaces, “If you look at Silicon Valley you see that the greatest innovators in the digital field have created a bland suburban environment that is becoming increasingly exclusive”. He makes a salient point: for all the splendor of the virtual kingdom the tech sector has created, the actual Silicon Valley is a sprawling carscape of highways, parking lots and quotidian, strip-mall inspired office parks.

## GOOGLE CAMPUS

How then should Architects seek to work with the digital inventors? Or perhaps the question should be, how do the likes of Google propose to work with Architects? In early 2015, the answer appeared to be: very directly. At that time, Google announced its plans to design a new campus. The hugely ambitious project was the boldest attempt to date by a tech company to merge their technological practice with architecture. In a promotional video, Google’s David Radcliffe (Vice President, Real Estate and Workplace Services) says that the tech giant took the unusual step of picking both Bjarke Ingals Group (“somebody who really thinks about function



Figure 1: The quotidian architecture of Google's current campus.

and form”) and Heatherwick (“attention to human scale and beauty”) to collaborate, dividing the traditionally singular role.<sup>2</sup>

The collaborators described a design proposal of staggering ambition, for “an incredibly flexible space”, so much so that the buildings would be able to reconfigure, reassemble, and even move location. This would purportedly be achieved by a “simple super-transparent ultralight membrane” stretched over a dynamic, adaptable structure. “Four futuristic structures where basic building elements — floors, ceilings and walls — attach or detach from permanent steel frames, forming whole new workspaces of different sizes. With help from small cranes and robots (“crabots”), interiors will transform in hours, rather than months”. The goal isn’t just minor adjustments to office partitions, but complete changes in program. Radcliffe refers to “Reconfiguring from office space, to automotive, to biotech...” suggesting an adaptability that could accommodate radical alterations from human-centric environments to industrial-specific spaces and back again with ease.

Crabots would purportedly be robotic cranes with various methods of mobility, including tracks and insect-like legs.<sup>3</sup> These contraptions would integrate with the building and grasp, lift and rearrange lightweight custom building elements when called upon. By proposing the application of such a robot in an actual construction, Google was leapfrogging the numerous architectural researchers worldwide

who are experimenting with robotic arms. Architectural academic researcher’s work has been typically restricted to using robots as CNC or pick-and-place devices in fabrication processes. Instead the Google team proposed a device that would be permanently integrated into the building and would modify the building during use. Around the same time, Google acquired numerous prominent robotics innovation companies (Redwood Robotics and Meka Robotics among others) involved in creating robotic arms that are “safe to operate near people”.

The Silicon Valley giants are clearly playing to their strengths by focusing on dynamism, preferring the mutable and the systemic over the crystallization of concept in form that is the traditional mainstay of architecture. The project appears to have been inspired by various visionary, yet ill-fated projects such as Cedric Price’s Fun Palace. Such cybernetically inspired projects that (perhaps ahead of their time) sought to invigorate static architectural convention with a dose of thrilling transformation. Google are continuing the cybernetic practice started by architects and preparing to branch out into the built environment. If we are to examine this activity in the context of ethics, then it would be productive to enquire, how does Google produce commodities and how do they manufacture a concept of value?

#### SEARCH: ADDING VALUE

Google has diversified many times since their formation in 1995, restructuring under an umbrella company, Alphabet, in 2015<sup>4</sup>. However, its core offering is still the product that launched it, Search (previously, PageRank<sup>5</sup>). It is safe to assume



that readers are familiar with Google Search, but its method of functioning may not be completely obvious. To grossly summarize: the system is a version of the academic citation system applied automatically to the internet, attaching a value to each web page based on its popularity. In abstract terms Search is an algorithm in which two participants achieve a goal by achieving parity in comprehension of the terms set by the user. One participant, the searcher, is ostensibly the observer of the system, but this system is also a participant, observing the searcher - recording the searcher's Search, web and other activity; increasing its chances of achieving parity of understanding in future by getting to know Searcher's behavior and building a model of them. In other words, Search learns what the Searcher values and prioritizes that content in its replies.

While Search has proved to be ubiquitously useful, it doesn't create revenue itself, So Google developed AdSense and AdWords. These applications automatically insert advertising into webpages and onto Search results pages respectively, collecting revenue from advertisers on a per click basis. Crucially, Google can leverage the profiles they build of individual users

and promise advertisers that ads will be placed in the path of consumers that are known to be interested in precisely that commodity.<sup>6</sup> In other words, Google sells what it knows about the values of people who use its free products. This seemingly simple business model has become the go-to strategy for successive generations of would-be internet moguls.

Search is an ostensibly altruistic offering, but the addition of advertising technologies complicates matters. Firstly, advertising itself provides a contentious layer of unsolicited information and quasi-culture on the internet. Secondly, the gathering of a vast repository of information about individual and collective interests raises concerns about surveillance and control. Thirdly, the process by which it is administered inherently evaluates and categorizes information on the internet. In summary, the process is primarily useful, yet not without issues. Matteo Pasquinelli writes that "Google establishes its own proprietary hierarchy of value for each node of the internet and becomes then the first systemic rentier of the common intellect".<sup>7</sup> In that sense, and to use a spatial analogy, Google is the landlord of the internet.



Figure 2: A concept design rendering of Google Campus One.



Figure 3: Driverless vehicle concept, by Rinspeed

It is a valid concern that Google may have become the internet's landlord, but it is not entirely fair to say that Google intend to ascribe value to web resources; the ostensible intention of PageRank was and is to reveal value and Search is successful only to the extent that it satisfies its users. The function is far less insidious than the reflexive distortions of information perpetrated in social media, most infamously recently for political ends. Perhaps too it is of little surprise that an organization operating under capitalism is haunted by a specter of self-interest – certainly the profession of architecture is not immune from the demands of capital. But what it is important to note is that the process by which value is revealed describes yet another value system. There is an inescapable ethical dimension to the invention of any decision-making processes. Within the context of this ethical dilemma, Google simultaneously seeks to capitalize on accesses of information and stands to benefit more from certain instances of information retrieval than others.

What should not be lost to architects is that Google is developing significant expertise in: (a) determining client's needs based on their behavior and the context of that behavior and (b) the appropriate allocation of space (albeit ad space for the time being) according to those criteria. The resulting systems are useful to billions of people and are a rampant commercial success. For better or worse, Google's systems represent the most successful organization, adaptation, or commercialization of virtual space in the world today.

Google states that its mission is “to organize the world's information and make it universally accessible and useful”.<sup>8</sup> To do so, they create a specific (if somewhat opaque) ethical framework for evaluating information. Now that Google are also building robots, vehicles, and buildings too, they are also creating ethical frameworks for the structures and systems of the spatial world.

### GOOGLE DRIVES

Google Campus One's focus on cybernetic architecture suggests a newly emergent spatial typology that is intelligent, interactive, dynamic, and mobile - but this interest manifests most in an unexpected way – through autonomous vehicles. Each of the Google projects discussed here is incrementally more spatialized than the one before it. PageRank/Google Search deals purely with information, the advertising applications deal with the allocation of virtual space. Google robotics research seeks to manipulate occupiable space. Now Self-Driving Cars occupy physical space while simultaneously being occupiable space.

A Self-Driving Car was the natural next step for Google Maps GPS navigation software, which already did everything to get a car from A to B short of actually driving the car. Google (now Alphabet) has been working on a self-driving car since 2009. They claim that prototype vehicles without steering wheels or other controls have test driven themselves more than 1.5 million miles to date.<sup>9</sup> Now branded as Waymo, Alphabet hope their Self-Driving Car will reduce accidents and facilitate mobility for seniors and the visually impaired - all laudable

goals in keeping with the benevolent best impulses of a company that has the unofficial mantra, “Don’t be evil”.<sup>10</sup>

Alphabet began testing their driverless vehicles in public spaces, clocking millions of miles on public roadways, before retreating to private testing. Now they operate a simulation city on a 1,642 acre, former Air Force Base outside of Fresno called Castle.<sup>11</sup> A Waymo car is able to use its cameras, laser range finder and LIDAR sensors to identify objects in its vicinity, even predict what those objects are likely to do next and respond accordingly. At Castle, researchers have dedicated roads representing a variety of real-world structures and scenarios where the machine-learning cars can be tested in different real-world scenarios, safely amassing experience that can be augmented with simulations to create a reinforced mapping of the real world.

By departing from the digital model of the map and entering the physical realm, the car generates a vivid new technic of ethics. Crucially, the Self-Driving Car can make decisions about which of a given number of undesirable outcomes is best (e.g. collide with an elderly pedestrian who has walked into traffic or evade and risk striking a parent pushing a stroller on the sidewalk?). The stakes are incredibly high. The system’s object recognition is being pitted in a life and death game. The Self-Driving Car’s artificial intelligence must transcend the capabilities of a simple ruleset and operate as a system of values, biases, and swift judgements.

Algorithmic bias has been recently brought to public attention by Joy Buolamwini, a luminary Fulbright and Rhodes scholar and MIT Media Lab student, who’s work on facial recognition

revealed machine learning’s capacity for bias. Buolamwini observed that facial recognition technologies only detect racially diverse faces if provided with a suitably diverse set of samples upon which to base their machine learning. The algorithms Buolamwini encountered had been trained on predominantly white faces and were unable to accurately identify black ones. Apart from being demoralizing for her personally, this oversight has startling ramifications when the facial recognition is deployed in the context of identity verification or law enforcement. Algorithmic bias, Buolamwini warns, can only be defeated through awareness and vigilance on behalf of those who write code. The ethical positions of the authors shine through in the work deliberately or inadvertently.

### BEYOND DRIVERLESS CARS – THE DYNAMIC CITY

Reflecting on Pasquinelli’s idea that Google’s web offerings exploit a “rentier of the common”, the common commodity being exploited in Driverless Car project is public space. If Google became the landlord of the internet through commodifying common knowledge, then will they have the potential to become the landlord of public space by producing spatial commodities from commonways? For the sake of speculation let us consider the possibility. To follow the logic of previous Google project monetizations - the adaptation of public (virtual) space to commercialized (virtual) space: in those terms, the planet’s roads and parking lots represent a massive undervalued real estate asset.

With the realization of mobile building, Google further blur the boundaries between robots and architecture. Liberated from the responsibility of driving the car, the passenger is now free to do as he or she pleases: docile and facile. Read



Figure 4: Driverless vehicles occupy “free” space in a concept image from IDEO





Figure 5: Driverless vehicles assemble to form an office interior in a speculative rendering from IDEO

a book, take a nap, spend quality time with family, click on advertisements on the internet... more-or-less anything that one might do while in a private building or sitting on a park bench. What form will these new cultural practices take, guided by the implicit values and embedded biases of their design parameters?

As the public becomes accustomed to the passivity and utility of driverless vehicles, these mobile spaces will attract new programs and uses. Through discrete incremental change, new cultural practices will evolve to occupy them, and methods to exploit and monetize them will occur. The spaces may change in scale and form, growing and adapting to new programs. At this foreseeable point, transport spaces will have changed, incrementally, from something reminiscent of vehicles to something more familiar as buildings.

These new places will also have the potential to introduce another paradigm of docility and facility through their capacity to move and their ability to make choices on behalf of occupants. The new cultural practices emerging in these changeable buildings will have been inherently influenced by the biases built into the algorithms informing their deployment. As Buolamwini asserts, there is an opportunity to take a position against bias at the beginning of development, but only by taking a clearly articulated position.

The potential for Google to amalgamate all physical and cognitive resources into monetizable content (just as they did

internet content) represents the ultimate commodification of technics. It is clear why so many companies, from Toyota, to Uber, to Apple are motivated to get involved in driverless vehicles. Even more remarkable is the way the emergence of the self-learning, autonomous vehicle challenges the way we understand the perpetuity and control of the built environment. Finally, the influence such advances could have on nurturing entirely new cultural practices and values promises to eclipse the impact of the already pervasive influence of mobile phone computing on shared and private environments.

#### UTOPIA POSTPONED

But the collaboration will not take the form of Google Campus One. The grand plan isn't proceeding (yet). Unable to acquire the land required, the project has been shelved and replaced with a humbler, more conventional vision for a smaller site.<sup>12</sup> Although the project was not discarded for lack of feasibility it is apparent the collaborators struggled to realize the ambitious scope. In a subsequent video interview Bjarke Ingels appeared uncharacteristically humbled and said, "we were working with a client that was constantly setting the goal way further than we were used to and it was our job to, rather than stretch everyone's imagination, was to land someone's imagination in a way that would be buildable and doable".<sup>13</sup> It was a curious sight to see the most bombastic figure in contemporary architecture so reticent, seemingly striking a balance between flattering his client and criticizing them.

Google Campus One joins an illustrious list of similar aspirational, dynamic building projects that remain on the proverbial drawing board, including Cedric Price's Fun Palace. But beyond an unachievable scope, key differences remain between Fun

Palace and Campus One that contributed to the latter's failure. Firstly, Fun Palace was a community centre; it was envisioned as a joyful place of coming together. It was also imagined to be a place where the building's dynamism was in the service of a collective process and a dialogue between the building and occupants. Google Campus One's dynamism seems to be chiefly inspired by its unknown sectors. There is a palpable tension in the Google building concept between a goal of adapting to serve the needs of the occupants and another desire to become anything, to be everything to everyone.

An uncomfortable tension also existed between the team of Google, Heatherwick, and BIG. Heatherwick projects are defined by an exquisite understanding of materiality and grasp of the potential for formal delight provided by the circumstances of any project. BIG projects are identifiable by cheeky but crystal-clear concepts that reinvigorate tired typologies with liquid beauty. Both architects could be characterized as witty and are committed to eliciting an experience of joy in the people who visit their work. Google's goals were less clear. At worst, there was simultaneously the pedestrian urge to maximize workspace combined with a vague impulse to appear to be innovative. The elusive quality that architecture (at its best) could teach other professions is perhaps the delicate balancing of disparate factors into an enduring form that elicits joy.

Koolhaas conceded to the European Commission that, "in the end, it is clear that those in the digital realm and architects will have to work together." So, what do architects offer this relationship? In many ways, the challenges facing architects and tech companies are similar. Both seek to balance the goals of capital, technological constraints, and socio-cultural values in the process of shaping the world. Yet architecture brings several centuries of experience balancing those disparate goals on the fulcrum of a delicate humanism (admittedly with varying degrees of success). The influence of the stunning innovations by organizations like Alphabet are indisputable. Architecture has honed a process that aspires to acknowledge bias and instill values in the products of its work, indeed such an ethic is the measure of success of much good architecture. As Architecture continues to be influenced by technological systems, it is the profession's commitment to human values systems and skill in actuating them that will ensure its continued relevance.

#### ENDNOTES

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