Enabled Users and Crowdsourced Culture

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In the days of computational almost-perfect reproducibility marked by sophisticated tools, such as 3D printers, laser cutters, or CNCs being original and creative involves reformulating tools and processes themselves. Modified programming scripts or the use of unprecedented materials appropriated from other industrial applications become starting points for creative explorations and the separation from the known and the obvious. This paper looks into new forms of cultural and creative participations associated with current maker and hacker cultures empowered by social electronic media and crowdsourcing. It discusses the impact of these new forms of collaboration on architecture and environment.

INTRODUCTION

Technology impacts how we live, how we think, and ultimately who we are. While it is often seen as yet another tool in a broad civilizational and cultural tool kit, it is a silent contributor to and modifier of the society—it promotes behaviors and empowers individuals who are in sync with its logic and are able to harvest it. As with its biological counterpart—evolution—technological (progress) culture does have preferred archetypes and outcomes. It promotes particular attitudes, mind-sets, and abilities. Technology can take the form of creative expression or be a driver behind transforming modes of production; however, it is a political force that has agency. Hackers and makers are agents of this cultural phenomenon, which creates a new preferred class of thinkers and change makers.

This paper looks into current cultural phenomena: maker and hacker cultures empowered by electronic forms of communication, by an easiness with replication and production, and by collectively developed knowledge. It discusses the impact of these new forms of thinking and collaboration on culture, environment, and architecture.In the days of computational almost-perfect reproducibility marked by sophisticated tools, such as 3D printers, laser cutters, or CNCs being original and creative involves reformulating tools and processes themselves. Modified programming scripts or the use of unprecedented materials appropriated from other industrial applications become starting points for creative explorations and the separation from the known and the obvious.

OPEN-SOURCE CULTURE

Either we can consider the emerging crowdsourced culture as a return to Athenian direct democracy or an achievement of the 21st-century society, the common expectation behind this paradigm is to regain the control of the environment both as a participatory space and as an individual creative conduit to the society at large. This desire already manifested itself in Bertolt Brecht's dissatisfaction with the one-directional nature of radio communication: "Radio is one-sided when it should be two-. It is purely an apparatus for distribution, for mere sharing out" (Brecht 1926).

It took the remaining part of the 20th century to realize the more collaborative and bidirectional opportunities for social communication aspired to by Brecht. However, this bidirectionality does not necessarily serve everyone equally. As with any human interactions, in electronic social networks often the loudest and most persuasive voices prevail. However, there are additional important dimensions of this social medium: creativity and virality that open communication channels and allow broader participation. This is not necessarily an ideal and democratic platform that treats everyone equally. It is rather an opportunity than an entitlement or individual right. Yet it is an effective authorship platform, conducive to experimentation and creativity, that facilitates greater idea/content generation. In this new scenario, culture is not only consumed by the public but also authored by them in the form of crowdsourcing. This authoring does not necessarily address changes in a broader physical form yet, but starts informing society functions by modifying established hierarchical structures and providing direct access to decision makers.This becomes visible in the *BOS:311* mobile app[1] (previously *Citizen Connect*), where Boston residents have a venue to inform the city administration about broken streetlights, street potholes, or uncollected trash. The app allows users to share a photo and a message together with the geo-location data to situate the event. Similarly, other cities experiment with technologies like Twitter to improve civic engagement.[2] The next step is to bring residents into decision-making processes such as planning budgetary expenditures. This is part of the modest initiative in several Polish cities called "*BudżetObywatelski*" (Civic Budgets), in which certain development and budgetary decisions are being voted on online by local residents.[3] While this is limited to relatively small projects, it is a meaningful step toward a better fit between citizens and their local government. It is an interesting test bed for future open-source and crowd-sourced government.

However, this streamlined and unfiltered communication between residents and city governments still relies on intentional actions of the concerned citizens to vote or to report a problem with the infrastructure. The future steps will involve an interface where users indirectly feed information and become sensors of a broader crowdsource network—without a need to devote time and effort to it. This approach raises valid privacy concerns, but in some instances the accompanying benefits could encourage users to participate in these networks. The *Waze* mobile app provides an effective case study of such balanced relationships between users as individuals and users as a group with shared interests. Self-described as the world's largest community-based traffic and navigation app, *Waze* harvests traffic data from its users by tracking their smartphone movements (car speed) and shares this information with other users. While it does potentially compromise privacy (tracking others while being tracked), it does provide enough benefits to participants to sustain the app's user base.

While bike and car share initiatives were often seen as an indication of this change demarcating the future to come, they quickly become transitional technologies for companies like Uber and Air B&B that provide analogues services without the need to own or even maintain their assets. While the debate about the meaning and the legal standing of these initiatives will surely continue, they are indicators of a larger cultural shift evident in other areas of life. YouTube—a media outlet without a content or message—is one of the early examples of this cultural trajectory. All these factors provide opportunities for new form of cultural dialogue and a new relationship between humans and the environment.

OPEN-SOURCE ENVIRONMENT

The Internet of Things (IoT) platform, utilizing distributed sensing, actuators, and microcontrollers, allows for a direct integration between embedded objects or buildings and users. Used for security access and controls, building data monitoring, or content authoring, mobile devices effectively extend spatially and conceptually what is considered a building and its perimeter. A mobile interface connects directly to what is often hidden within and defined as a private realm. Smartphones also provide opportunities for greater public participation in authoring media contents, in a similar way as the D-Tower project by artist Q. S. Serafijn and architect Lars Spuybroek (NOX) does. However, the greater conceptual relevance lies in their similarity to artistic media projections done by Krzysztof Wodiczko, projects in the Media Façade Festival such as a SMSlingshot installation by VR/Urban, or works by the NuFormer[4] studio that start redefining the boundary between ownership in public and private domainswith projection mappings.

Along the same lines but breaking out of the socially correct framework, Graffiti Research Lab (GRL) develops urban media interventions that challenge the traditional demarcations of public and private, appropriate and inappropriate. Their purpose stated in their motto "dedicated to outfitting graffiti- and street-artists with an open source technologies for urban communication" is activated through the development of "tools of subversion and mass dissent. Like a giant graffiti laser.[5]" A certain level of dissent represented in GRL's work moves the center of creative gravity outside the comfort of art galleries into an authentic street art. However,

GRL works still do not achieve a guerrilla status like that of Banksy public art. Anonymity is a common denominator of Banksy's art and traditional graffiti, and in this case, it is a strong differentiator from prescribed and staged digital installations that feel more like works ported out of the gallery, not home-grown street happenings. This anonymity of street art, and the expressive freedom associated with it, can be put back into digital media installations by developing systems that integrate individual participation through the use of mobile devices.

Furthermore, virtual (augmented reality-based) and projection (projection-mapping) media creations escape the simple societal judgements that are directed at graffiti art or tagging. Since they do not deface or damage private property and often serve an important social role, virtual and augmented transgressions become socially acceptable and often a preferred form of communication.

While new computational and media technologies makes us rethink established modes of creativity and address design concerns that were previously unsolvable (outside a designer consideration), they also open new territories that are both exciting and less familiar. Maker and hacker culture reformulates traditional inert notions of architecture and design production. The built environment will no longer be designed from scratch but rather tweaked and re-appropriated from existing or mass produces elements with a data-driven understanding of its context. This will become significantly more pronounced when the built environment will be defined less by its physical form—hardware—and more by its software--embedded electronic and media functionalities. The discussed examples point to new forms of public participation. They question an established ownership by re-appropriating, often just symbolically, the public domain.

OPEN-SOURCE DESIGN

While the Maker Movement empowers designers and architects by putting them in a direct contact with the production of the built environment, more importantly it transforms the relationship between creators and users. The participants in the built environment expect a similar level of involvement in and authorship of the public domain as architects have. Being a silent and passive consumer of design and culture no longer is glorified or aspired to. Democratized environments allow users to customize and make them adaptive to their personal and often esoteric needs. This significantly shifts the role of designers and the types of designs they produce. Open-source, open-ended, crowdsourcing are just some of the modifiers of cultural modes of production that define new relationship between the creativity, intellectual property ownership and authorship. This consumer aspiration is being noticed by companies that are developing modular, open-source designs as a base for do-it-yourself movement. For example, Opendesk[6], a global furniture design platform for "local making," allows consumer to download drawings and fabricate furniture themselves or through the network of local fabricators. So called "open making" helps designers to get global presence and distribution, makers to meet customer, and customers to have "designer products without the designer price tag." Similarly, mobile app such as Autodesk's *123DCatch* not only allows for photogrammetric capture of a 3D model but also connects users with 3D printing companies. These

initiatives would not be able to succeed without electronic networks that facilitate almost-instant knowledge and technology transfers as well as new forms of collaboration such as crowdsourcing. Collective wisdom and collective authoring (creativity) further redefine maker culture, shifting the center of gravity from an engaged artist or designer into enabled consumers and users. This shift provides opportunities for greater social appreciation of design. However, it also redefines the roles designers play from sole content creators to mentors and facilitators of socially and culturally driven creativity. This repositioning quantifies design as a resultant of collectively and individually made choices driven by value, image, and cultural relevance.

Opportunities for design and architecture to be crowdsources and implemented by the end users is directly associated with the democratization of means of production and authorship. In this case, the democratization of means of production relates not only their economical but more often to their intellectual and conceptual accessibility. Particularly within the developed economies, access to advanced technologies is relatively level; however, the majority of society may not be able to use the tools and technology they are surrounded with. This issue is starting to be addressed, at least partially, by developments in open-source and open-access knowledge sharing. The knowledge sharing may be structured as formalized online resources, ranging from massive open online courses (MOOCs) or DYI communities such as Instructables to knowledge and data repositories such as GitHub for code development or various sites for 3D models, images, or video sharing. This ability of open sharing combined with modularity of data—parts of code that can be easily reused and reappropriated—allows for spontaneous design and knowledge developments facilitated by quick prototyping and real-time feedback loops. An example of such empowerment associated with new ways of knowledge sharing is an orthodontic treatment developed and self-administered by a university student, Amos Dudley[7]. The project gained almost instant media attention, including publicity from CNN[8] and the *Washington Post* as well as engaged discussions on various public forums and blogs. This example represents a creative and entrepreneurial mindset that capitalizes on technological opportunities available to everyone and easily obtainable. However, 3D printing of Invisalign-like orthodontic treatment by Dudley would not be possible without easy access to know-how and technological means of production. It would not be as impactful without an almost instant and often viral information sharing.

How this can redefine architecture and design teaching is still an open question. However, we can see that the most innovative makers and creators are those who are capable of taking advantage of various technologies and collaging their capabilities, not necessarily developing them from scratch. The ability to adapt and rethink an already existing design by tweaking various physical parameters becomes a critical aspect of creative/innovative design thinking. This transforms architecture from an autonomous, self-defined field into a highly interconnected discipline that benefits significantly from technological and conceptual translations from other fields. It is also moving away from a model of a singular design creation—each project is unique—into a versioning paradigm where design is a process realized through multiple actualizations, perhaps released yearly as an upgrade to the last version. This would align architecture with other design disciplines where significant parts of product functionality are continuously redefined by software updates and custom mods. This is the case with Tesla, which comes with all the sensors and technologies to be a fully autonomous (level 5) vehicle, technologies that are currently partially disabled. Once future software upgrades become available and full self-driving is allowed, these functionalities will be pushed into vehicles. This is already customary with smaller upgrades such as the recent one for Tesla's autopilot.[9] A similar strategy for engaging battery hardware was also implemented by Tesla, where cars are shipped with extra battery capabilities that can be unlocked remotely.[10] How these strategies translate to architecture and the built environment is hard to predict. However, with the increased role embedded systems play in defining building performance and use, it is expected that software-running buildings would follow a similar path of upgrades and consumer on-demand choices to what Tesla started offering. Then again, the discussion of makers and hackers becomes relevant, since cars and buildings will be subject to hacking and playgrounds for entrepreneurial makers who will try to take control of buildings and redefine their architecture.

IOPEN-SOURCE HACKERS

While hacking has been routinely associated with computer programming and security cultures, the concept has much broader user base and applicability. From artists and urban culture hackers, such as Improve Everywhere to do-it-yourself (DIY) movement with re-appropriated industrial products and embedded new material to video game mods and modified electronic products. This new and broadly-defined hacker culture addresses two critical cultural issues: (1) democratizes the material culture by lowering the participation threshold and (2) provides opportunities for crowdsourced creativity, its expression, and adoption outside monopolized industrial and intellectual culture.

In a broad sense, hacking is a form of re-appropriation of an object or a system for another purpose than originally intended. It is re-appropriation of an idea and giving it a new use often in the meaning that contradicts or challenges the original intent. It is not only defined by the activity but also the manner in which it is achieved. It explores the space of unintended consequences with possible highly creative returns.

COLLECTIVE THINKING

In studying social groups and networking, researchers are finding that a group of minds possesses a unique power of collective thinking, which cannot be matched by a number of individual minds. James Surowiecki has written about this power, most notably in his book The Wisdom of Crowds, where he examines the evidence suggesting that, "under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them." (Surowiecki 2004) Collective decision making has influenced politics and the economy in both positive and negative aspects, but ultimately contributes to broader, more dynamic and resilient systems. It has become a cornerstone of democratic and free societies. Can this approach be extended to collective collaboration, authorship, and creativity in a similar way to the process by which Wikipedia's content is developed? Can the power of crowdsourcing be harvested into effective creative or innovative enterprises?

Howe connects the popularity of crowdsourcing with an increased popular use of electronic, previously high-end, tools by the general public.[11] This is another take on the common observation about digital technology being responsible for the democratization of authoring and production of intellectual work. Democratization of technology reduces the gap between professionals and amateurs, and between developed and developing economies. Opinions on the effectiveness of crowdsourcing are mixed. Enthusiasts often reference the success of consumer-created Super Bowl 2011 commercials for PepsiCo's Doritos and Pepsi Max Brands[12] as one of the successful examples. However, this example may not be representative of the aspirations and possibilities associated with crowdsourcing. Consumer-created Super Bowl commercials do not innovate anything; rather, the USA Today ranking evaluates the popularity of a particular advertising concept. While watching these commercials, one is not overwhelmed with their conceptually innovative narratives; rather, they connect with rudimentary and stereotypical ways to promote a product, as is the case with *Pug Attack*[13] which achieved the top ranking in the USA Today Ad Meter.

Nevertheless, there are a number of promising examples that could help to transcend the intellectual status quo and enable new modes of collective creativity. The premise of open-source collective thinking set the conceptual framework of Web 2.0, providing a basis for the success of platforms such as YouTube, Facebook, Craigslist, and even Expedia and Amazon, with users' input as a critical component of their business. According to Tim O'Reilly and John Battelle, organizers of the original Web 2.0 Conference, "Collective intelligence applications depend on managing, understanding, and responding to massive amounts of user-generated data in real time.[14]" In many ways, collective intelligence is an extension of a "fridge poetry" game, or of the surrealist exquisite-corpse authoring method, with creative outcomes emerging out of fragmented and independent contributions. These fragmented contributions are biased by personal goals or misconceptions, but often still manage to deliver unexpected and innovative results. The same concept of including diverse viewpoints and averaging opinions applies in the case of Web 2.0-enabled collective authoring.

What opportunities might we find in tapping in to this collective intelligence by integrating the technologies available to us into our public spaces, our buildings, floors, and walls, and synchronizing them with our now-ubiquitous portable devices?

THE OTHER SIDE

Crowdsourcing and open-source culture benefit society through employing distributed intelligence and collective creativity to localized problems such as finding vulnerabilities in the software. However, there are also drawback and limitation of the open-source approach. Since these projects are usually self-commissioned and run on voluntary bases, their lifespan is not predictable. They are often developed only to the extent they serve original goals or a creator and may not continue without further support or development.

WE THE USERS

The democratization of knowledge through open-source sensor networks can be seen in the crowdsourced movement that emerged after with the Fukoshima Daiichi nuclear plant disaster in March 2011. The efforts to contain radioactive spills and to understand the actual impact on the environment were inconsistent and caused serious social concerns about the reliability of the official reports. A number of activists developed an independent platform for environmental monitoring, specifically focusing on the deployment of Geiger counters throughout Japan. While this initiative originated from local concerns regarding the nuclear power plant radiation, it quickly acquired global relevance in the current climate-change context by developing a platform to share findings and "empower people with data about their environments.[15]" This platform—Safecast--followed a framework already established for similar data infrastructure and community initiatives for the Internet of Things, such as Pachube/Cosm/Xively.The Fukoshima radiation monitoring project by Safecast is just one of many crowdsourcing initiatives to increase awareness about the collective environment and mobilize social activism. Since gathered data is shared and public, it becomes a political and activist platform to reappropriate leadership within and ownership of the public realm. This shared and crowdsourced data breaks what is often seen as informational asymmetry, or even monopoly, that disadvantages large portions of society.

THE PRODUCT IS YOU

Another and perhaps highly controversial repositioning occurring within wired cities is a freebie culture. We are getting quickly accustomed to free perks associated with open-source and crowd-funded products and services such as, computer software, email accounts, or Wi-Fi access. While this is a part of the changing in perception and expectation of what is the basic set of citizen rights and what constitutes social infrastructure, it is also an extension of a new and aggressive business model. What often comes unnoticed is who is funding free services. As it has been often noted: "if you are not paying for something, you are not a customer; you are the product being sold." This observation was popularized by Andrew Lewis,[16] but it also builds on previous discussions on consumerism, such as Adbusters' video[17] from 1999: "The Product is You.[18]"

However, this relationship seems to be, at least to some degree, symbiotic. There are other reasons why free models are attractive to users and developers. For the developers: "not paying means not complaining" while for the customers not paying for the service does not mean automatic reduction in quality of service .

CONCLUSION

While in the emerging media-based environments many of the offline functions and activities are being ported into the virtualized worlds, this does not significantly redefine the structure of human habitation. Electronic social networks do replace or extend city squares or ancient agoras into new forms of social communications, as pointedly predicted by William Mitchell (1996) in *City of Bits: Space, Place, and the Infobahn*. However, the simple mapping of the city from the physical into the virtual misses a whole new class of users and possibilities.

An important message for architects is that the maker and hacker culture ultimately will penetrate the traditional inert notion of architecture. The environment will not be built from scratch but rather it will be tweaked and re-appropriated from existing or mass produces elements. This will become even more pronounced at the point when the built environment will not only be defined by its built form—hardware—but also its software--embedded electronic and media functionalities.

Finally, what does the hacking culture mean for the built environment? Does it allow for customization of architecture and user considerations to the greater extent than it is presently possible or practiced? A new form of creativity, an alternative form of ownership, a new form of political expression and power, these are all possible answers and future

trajectories.

ENDNOTES

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