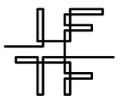




How the maker mindset & technology are reinventing urban life

Cities have always been the place where our imaginations, hopes and dreams live. They are the nexus where people, ideas, and possibilities come together to create the future.

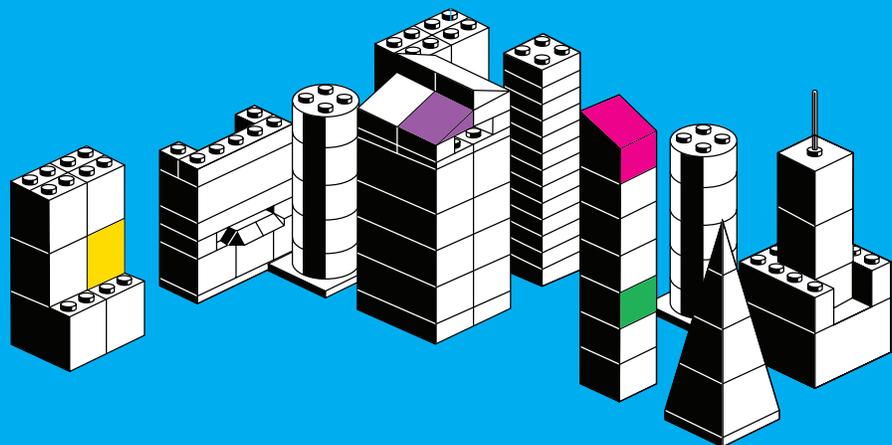


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OVER THE NEXT DECADES, OUR CITIES will unlock as yet unimagined possibilities of urban life. They will draw in nearly a billion new urban dwellers and spur the largest and fastest reinvention of our built environment in human history. In the process, they will capture the creativity and inventiveness of a new breed of citizens—the makers—opening up participation, resources, imagination, spaces, and economic opportunity. These makers, in turn, will quite literally fabricate a new kind of city: the open city.

TECHNOLOGY CATALYSTS | The reinvention of our built environment is taking place in the context of broader social and technological forces that are catalyzing new visions of what a city can be. The technologies of making—from ubiquitous sensing and liquid data to synthetic biology and 3D printing—are becoming more modular, more scalable, and more accessible to billions of people. In combination with one another, they will swiftly remake the landscape of the city, both technological and social.

THE MAKER MINDSET | As the tools of making spill out of walled-in factories and into city streets, networks of engaged citizens will use them to transform the realities of urban life. Fueled by the energy and creativity of the urban nexus, these makers will not only use the emerging tools and platforms to remake the physical world. They will remake the mindset for “how we city” with everything from open urban R&D to open logistics. Out of their experiments will emerge a core set of open-city strategies that will define the urban experience for decades to come.



OPEN CITY STRATEGIES

Open cities create new forms of **PARTICIPATION**

In a decade, access to open data linked to physical spaces will create cities embedded with abundant opportunities for civic, social, and commercial participation. Already, place-based data is spawning tools and platforms like PulsePoint, an app that notifies qualified first responders when a medical emergency occurs nearby, and GigWalk, which alerts users to paid microwork gigs in their area in real time. The combination of open data and these context-aware technologies will open new context-based forms of micro-participation in the urban ecology, cultivating transparency and blurring the traditional boundaries of authority and hierarchy.

Open cities are designed for **SHAREABILITY**

Cities have an enormous latent capacity to enable citizens to share tangible goods, raw data, expertise, time, or assistance. Coordination tools for sharing excess capacity will allow us to extract more value from physical goods and create new kinds of commerce as well as charitable giving. At the same time, apps like Waze, which aggregates user data to create traffic maps, point to new ways that sharing citizen-generated data will create entirely new kinds of value—and new experiences of the urban landscape. As people apply the ethos and framework of Creative Commons to social and community life, they enable others to share and create new social connections.

Open cities inspire **IMAGINATION**

The next decade’s virtual reality and augmented reality tools will enable artists and citizens to reimagine their communities and persuade others through immersion in “what-could-be.” VRban, a virtual reality application that helps people explore and manipulate real urban environments for planning, provide a foretaste of the possibilities for linking design to experience as cities reinvent their built environments. As lightweight tools for simulating and prototyping emerge, anyone will be able to create and share ever more radical plans for public spaces and to persuade others to join them. Visioning tools and practices will proliferate, opening the future of cities to everyone.

Open cities make spaces **ADAPTABLE**

Today, food truck courts and parklets—those curbside parking spaces converted to public benches and walkways—are among the most mainstream examples of a broader trend toward recolonizing urban spaces to make them more open, public, and social. The shifting demographics of cities will transform needs, habits, and even values, which, in turn, will change the demand and priorities for the use of public spaces. At the same time, the advent of lightweight manufacturing technologies and crowd-sourced “recipes” for doing almost anything will accelerate the ability to place-make. With more adaptable spaces, cities will become more open to the needs and whims of populations.

Across the population, open cities create **EQUITY**

At its core, open cities are about making spaces, services, and economic opportunities open and accessible to all citizens, regardless of age, ability, and socioeconomic status—that is, they’re about creating new standards of equity. As they leverage open data, shareable resources, and adaptable spaces to meet emerging needs across diverse populations, open cities create alternative pathways for people to meet these needs. They also create a culture of innovation in which these alternative pathways achieve parity with traditional rewards. While complete equity may never be attained, expanding equity across populations will ensure more resilient and sustainable innovations.

TECHNOLOGY CATALYSTS

for rapid experimentation and scaled innovation

Makers instinctively borrow the ethos of openness and experimentation from the open source software movement and apply it to objects in the physical world. Four key trends in the world of technology are set to catalyze even wider application of this open source ethos and accelerate the evolution of the open city.

COMPUTERIZING THE PHYSICAL WORLD

Emerging technologies are blurring the line between bits and atoms. A 3D printer, for example, allows a person to use digital specifications to render an object in physical form. The kinds of objects and materials these 3D printers and other lightweight manufacturing devices can produce are expanding rapidly—from textiles to medical devices to food. The manufacture of physical objects will thus be subject to the same phenomena that have already transformed the production of media and information.



Dus Architects



NOTImpossible

KAMERMAKER This 20-foot-tall 3D printer, which was commissioned by a Dutch architecture firm, can fabricate rooms that can be easily assembled to form an entire house.

PROJECT DANIEL NOTImpossible Labs created a 3D-printing prosthetic lab and training facility in Sudan that creates functional prosthetic limbs for about one hundred dollars.

RECOMBINING AND REMIXING INNOVATION

The digitization of the physical world and expanding access open up manufacturing to the same armchair hackers and open-source creators that have driven astonishing levels of activity in software over the last few decades. The development of Application Protocol Interfaces (APIs), for instance, creates a technology catalyst that allows one software program to use another so that complex solutions can be built up, like Lego blocks, from simple parts. Solutions built with these tools can be easily copied and remixed. While hackers have a long history of innovation through mixing, they will now drive a “recombine and remix” approach to innovating everything from textiles to food.



Arduino



ift.com

ARDUINO This streamlined digital hardware platform is designed to simplify the creation of interactive objects or environments.

IF THIS THEN THAT With this service, users can connect different digital applications with each other and with web-connected physical objects through simple conditional statements known as recipes.

EXPANDING ACCESS IN THE MARKETPLACE AND THE CLOUD

Much as computers have dropped in price while dramatically increasing their capabilities, the cost dynamics of digitization are rapidly expanding access to very powerful manufacturing and scientific research tools. Access to even the most expensive connected tools is now often possible from anywhere and by anyone, so innovation becomes decentralized. What works well in one place can be directly copied, tweaked, and ported to another place.

Clockready, under Creative Commons ShareAlike license



IBM

WATSON DEVELOPER CLOUD IBM has opened access to its advanced cognitive computing system, Watson, for developers who are interested in creating new applications “powered by Watson.”

Osman Kalkavan, under Creative Commons ShareAlike license



techpolicydaily.com

MOORE'S LAW IN YOUR POCKET The price of many technologies is dropping fast: according to TechPolicyDaily.com, a smartphone that currently retails for as little as \$100 would have cost \$3.6 million in 1991.

AMPLIFYING NETWORK EFFECTS

Networks can be used as much more than a medium for exchanging ideas with collaborators—they give makers access to audiences and markets that were previously only accessible to large institutions. Makers can build services on top of existing networks such as Facebook and bring products to anyone the world with astonishing speed. This ability to amplify impact through networks drives innovation to larger and more public audiences, building collaborative capacity.



Oculus.com

OCULUS RIFT The power of crowdfunding raised over two million dollars to take a VR headset concept from a tech demo to a functional developer kit model in less than two years. Then Facebook bought the company for \$2 billion.



gotinder.com

TINDER This matchmaking app uses Facebook's social networks to gather photos and basic information to make matches and verify identities.

A MAKER MINDSET

for launching open city platforms

Already, makers are hacking, remixing, and combining technology catalysts to create openness in cities. These forecasts describe how new tools and platforms will be used to meet existing and emerging needs of city dwellers—and remake how we live, work, and play in the city.

ORCHESTRATING URBAN LIFE

As cities “wake up” with the capacity to track increasingly granular information about the people and objects that traverse it—and the ability to respond to that information—systems will emerge to help orchestrate urban flows of all kind. Makers will use these systems to coordinate and synchronize previously hidden or untapped resources to match their real-time demands. They will use high-resolution urban data to create personalized alerts, nudges, routes and choices that appear in the right place at the right time. Going beyond personal convenience, these coordination platforms will be designed to achieve specific urban goals, such as promoting neighborly habits and triggering groups to act in concert. More and more, the city will interact with its inhabitants as a complex living entity.



Engineered Serendipity Machine learning algorithms enhance serendipitous encounters, connecting individuals to events, civic activities, or other people based on historical desires and tendencies.

Automated Delivery Drones and the Internet of Things enable autonomous delivery of many of life's necessities—groceries, medicine, dinner—via an infrastructure connected not only to consumer preferences but also to community capacities for fulfillment.

HARNESSING CROWDS AND MICROCONTRIBUTIONS

Weaving together micro-contributions of information via crowdsourcing platforms, maker-minded citizens will supplement and surpass many traditional city services. Today's tools and platforms already help people collectively spot, map, and report problems such as blighted infrastructure or hyper-local health risks. Over the coming decade, they will tap the crowd for solutions to these problems: micro-contributions of money, know-how, and labor that can sidestep budget stalemates and slow-moving bureaucracies. Beyond repairing damage, individuals will connect and share resources—what IFTF calls “socialstructuring”—to envision new features for the city and collaboratively build them. As these efforts grow, socialstructuring will become a tried-and-true approach to providing social as well as material support and services.



Bottom-up Municipal Bonds Online platforms enable citizens to bid on and own local civic investments, identify projects, and crowdfund the equivalent of municipal bonds to get even large-scale initiatives off the ground.

Crowdsourced Caregiving Coordination technologies enable urban dwellers to share physical tools, responsibilities, and care, matching elders and other individuals with qualified caregivers for discrete services at the right moment.

CREATING MASSIVELY PARTICIPATORY GOVERNANCE

The ideal vision of a fully participatory democracy has long been hampered by constraints of time, place, and coordination. However, makers and entrepreneurs are already using existing communication tools to close this gap between intent and action. The key will be innovations that make governance and feedback more open, responsive, and relevant to all citizens. Micro-voting, participatory simulations that model the effects of proposed legislation, crowd-hacking of maps to remix views, and open technology initiatives will bring future visions to the streets, making room for new priorities of a massively participating citizenry. These initiatives will also build more collective intelligence to help people see the alignment between their individual needs and the city's well-being.



Massively Muticitizen Democracy Mobile voting platforms transform representative democracy, as they enable citizens to vote on every issue in real-time. Elected officials become avatars of the crowd's desires.

VRban Development Virtual reality tools enable urban planners to observe and design a city's buildings and infrastructure, integrating citizen testing and feedback on projects before any construction begins.

LEARNING GLOBALLY, PROTOTYPING LOCALLY

Over the next few decades, 3D printing and other fabrication technologies will unleash a torrent of maker creativity and productivity. The ability to prototype rapidly and inexpensively will enable cities to reinvigorate local production, driving more self-sufficiency. Builders will create everything from lower-cost seismic retrofits to build-in-a-day houses to mold-breaking commercial products. As experiments proliferate, radically imaginative design will mimic nature or appear totally alien while using efficiently uniform constructs that are designed for maximum interoperability and effortless part replacement. With wikis and other storehouses of evolving knowledge, people will learn from and build on the successes and failures of others around the globe.



3D-printed Infrastructure Advances in additive manufacturing enable cities and citizens to repair and construct infrastructure with 3D-printed materials, reinvigorating local production, spurring labor market growth, and fostering rapid adaptation to changing urban needs.

Corner Store for Fabrication Using next-generation 3D printers, lightweight manufacturing “corner stores” emerge to provide a wide range of products, as well as the tools that people need for their own micro-production projects.

STRIKING BACK AGAINST SURVEILLANCE

As cities more easily monitor personal information and track personal movement, maker efforts to disrupt both top-down and bottom-up surveillance systems will grow. Just as innovators have developed services for using the Internet anonymously, makers will create tools to avoid, sabotage, and redirect the always-open eyes of the city. From hardware hacks to keep devices off the city's radar to alternative monetary systems, citizens with a maker mindset will craft creative solutions for keeping their information from government and commercial entities. In addition, attempts to hijack the city's sensing and broadcasting infrastructure for privacy, political expression, criminal activities, and just plain fun will proliferate.



Incognito Innovation A new market blooms as makers design and sell services, devices, and workarounds to hide from the pervasive sensing of the open city.

Trusting Community Currency As cryptocurrencies such as Bitcoin gain the trust of users, the state loses its monopoly control of financial flows, blurring the lines between gray markets and legal trade.

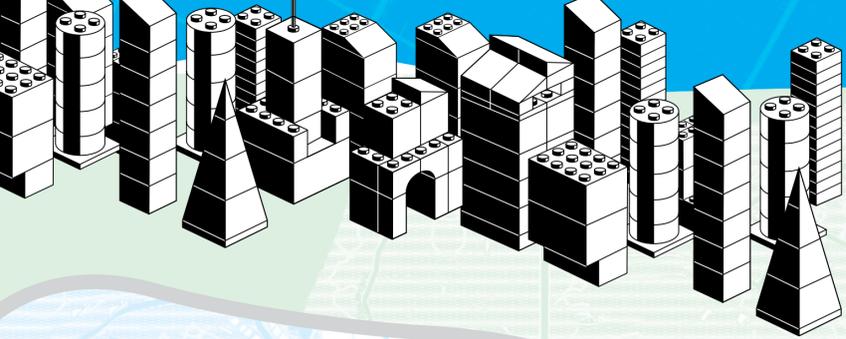
CREATING ART AS ACTION AND PROVOCATION

Art has always been a powerful path for people to understand and envision the future. In the coming decades, new tools will allow everyday people to share their visions of the city in more vivid ways than ever. Makers and artists are already using art to imagine new civic futures. Platforms for 3D printing and virtual reality will bolster these efforts, making it easy to create immersive installations. Artist-activists will see the city as a medium for expression and, as their works coincide with new governance models, the city will become a canvas for innovating governance through art.



Synthetic City Experiences Art installations unveil some of the more dystopic strategies that will emerge in a world of virtual and augmented reality, illustrating the manipulative capacity of these technologies.

Virtual Reality for Protest In the midst of protests, artists launch virtual-reality installations, allowing citizens to induce visceral experiences of what it's like to live inside a wide-variety of modern-day conflicts.



ORCHESTRATING URBAN LIFE

Makers coordinate resources to match real-time demand and use data to create personalized alerts, nudges, and routes.



Engineered Serendipity
Yahoo researchers developed an algorithm that calculates routes for users based on how beautiful they are.



Automated Delivery
The Matternet network of UAVs will provide medical aid to some of the world's most remote populations.

HARNESSING CROWDS AND MICROCONTRIBUTIONS

Weaving together microcontributions, networked citizens will supplement and surpass traditional city government activities.



Bottom-up Municipal Bonds
The Neighbor.ly crowdfunding platform allows citizens to invest in municipal bonds to finance civic developments from inter-neighborhood networks to pop-up dog parks.



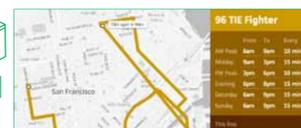
Crowdsourced Caregiving
The proposed ITN South Delaware cooperative will coordinate volunteer drivers, a few paid drivers, and possibly local taxis to transport seniors as needed.

CREATING MASSIVELY PARTICIPATORY GOVERNANCE

Makers and entrepreneurs create new governance platforms that are more open, responsive, and relevant to all citizens.



Massively Multi-citizen Democracy
Atlanta City Council candidate Jon Jones ran on a platform of direct democracy for local issues through smart phone voting.



VRban Development
The Owl augmented reality viewer shows potential developments in situ to help the public better understand changes to their city.

IGHOWHA

The Challenge | Harness civic data to create social value.

The Response | Bypass institutions and connect citizens directly for work, play, services, and care.



SISU

The Challenge | Prepare locally to protect against global volatility.

The Response | Integrate local food and energy efforts with distribution and global innovation networks.



PARTICIPATION

- Cultivate transparency and embrace diversity
- Blur boundaries and flatten hierarchies

SHAREABILITY

- Map latent capacities and create new exchanges
- Leverage networks for trust and scale

COMPUTERIZING THE PHYSICAL WORLD

3D printers and lightweight manufacturing blur the line between bits and atoms

EXPANDING ACCESS IN THE MARKETPLACE AND THE CLOUD

Digitization expands access to powerful manufacturing and research tools

RECOMBINING AND REMIXING INNOVATION

Open-source approaches make manufacturing solutions shareable and remixable

AMPLIFYING NETWORK EFFECTS

Networks provide makers with access to global audiences and markets

IMAGINATION

- Create "alternate realities" to provoke new ideas
- Embrace artists as futurists to challenge assumptions

ADAPTABILITY

- Reclaim public space for community
- Harness civic participation with adaptable spaces

OPEN CITIES

Start making the future

CHOOSE YOUR OPEN CITY STRATEGIES

ACCELERATE YOUR STRATEGIES WITH TECHNOLOGY CATALYSTS

CREATE AND COMBINE MAKER PLATFORMS

IMMERSE YOURSELF IN FUTURE VISIONS

Ask:

MAKER MINDSET

Where are the makers in your city?

TECHNOLOGY INFRASTRUCTURE

What is the technology capacity of your city?

URBAN CHALLENGES

What are the most urgent challenges in your city?

EQUITY

- Make inequities visible to provoke action
- Co-create solutions from the bottom up—don't design from the top down

STRIKING BACK AGAINST SURVEILLANCE

Hacktivists and others will hijack the city's sensing and broadcasting infrastructure for privacy, political expression, criminal activities, and fun.



Incognito Innovation
Cv.Dazzle uses camouflaging makeup to create an "anti-face" that disables facial recognition sensors from analyzing an individual's face.



Trusting Community Currency
Some cryptocurrencies, including "joke" virtual currencies, are worth more than the official currencies of several countries.

VIELFALT

The Challenge | Create diverse and thriving economic opportunities.

The Response | Support hyperlocal economies and ground neighborhood identities in trades and arts.



NOVO LIBRE

The Challenge | Transform an island economy into a global powerhouse.

The Response | Create a radically open, free-market economy.



CARBONVILLE

The Challenge | Create mobile infrastructure and permanent community.

The Response | Develop guidelines for the sustainable, reliable creation and dismantling of habitation for displaced populations.



LAS NUBES

The Challenge | Create stable jobs in an increasingly competitive, fragmented economy.

The Response | Coordinate microwork to become a hub for outsourcing.



KENGA-SHI

The Challenge | Harness participation to optimize health and well-being.

The Response | Use citizen data to create responsive, health-promoting environments.



CREATING ART AS ACTION AND PROVOCATION

3D printing and virtual reality allow makers to create immersive installations and share their visions of the city.



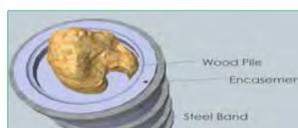
Virtual Reality for Protest
The augmented-reality car decals app lets users post decals to vehicles, such as police cars, as a form of protest.



Synthetic City Experiences
The Sea of Tweets projects takes supportive tweets from around the globe and puts them on paper cranes in areas affected by the 2011 Tohoku earthquake and tsunami.

LEARNING GLOBALLY, PROTOTYPING LOCALLY

Lightweight fabrication technologies allow makers to prototype urban infrastructure rapidly and cheaply.



3D-printed Infrastructure
New York City is 3D-printing infrastructure for its piers.



Corner Store for Fabrication
Brick and Maker is an "open source franchise" of proposed stores that would provide on-demand 3D-printing and retail space to community members.

HOW TO USE THIS MAP



This map is a tool to help you cultivate a maker mindset as you participate in the reinvention of the city as an open city. Use it to anticipate future challenges, leverage technology catalysts, zoom in on zones of innovation, and make your city—or any city—a better place for everyone to work, play, and make the future.

START MAKING THE FUTURE

This map walks you through the open city, starting with strategies, followed by technology catalysts and maker platforms, and finally immersing you in visions of the future.

Get started by asking the following questions: Where is the maker movement in your city? How does it reflect your unique culture? What is the technology capacity of your city? Is it sufficient to seize future opportunities? And what are the most urgent challenges your city faces that this convergence of makers and technology can address?

OPEN CITY STRATEGIES	TECHNOLOGY CATALYSTS	MAKER MINDSET	VISIONS OF OPEN CITIES
CHOOSE the open city strategies that can best meet your challenges and review recommendations to jumpstart your thinking.	ACCELERATE your strategies by leveraging the technology catalysts that are empowering makers.	CREATE and combine platforms to enact your open city strategies.	EXPLORE the visions to anticipate future urban challenges and maker-minded responses.

INSTITUTE FOR THE FUTURE

The Institute for the Future (ITF) is an independent, nonprofit strategic research group with more than 40 years of forecasting experience. The core of our work is identifying emerging trends and discontinuities that will transform global society and the global marketplace. We provide our members with insights into business strategy, design process, innovation, and social dilemmas. Our research spans a broad territory of deeply transformative trends, from health and health care to technology, the workplace, and human identity. The Institute for the Future is located in Palo Alto, California.

TECHNOLOGY HORIZONS

The Technology Horizons Program combines a deep understanding of technology and societal forces to identify and evaluate discontinuities and innovations in the next 3 to 10 years. We help organizations develop insights and strategic tools to better position themselves for the future. Our approach to technology forecasting is unique—we put people at the center of our forecasts. Understanding humans as consumers, workers, householders, and community members allows ITF to help companies look beyond technical feasibility to identify the value in new technologies, forecast adoption and diffusion patterns, and discover new market opportunities and threats.

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