Making Smart Public Space by SIDI

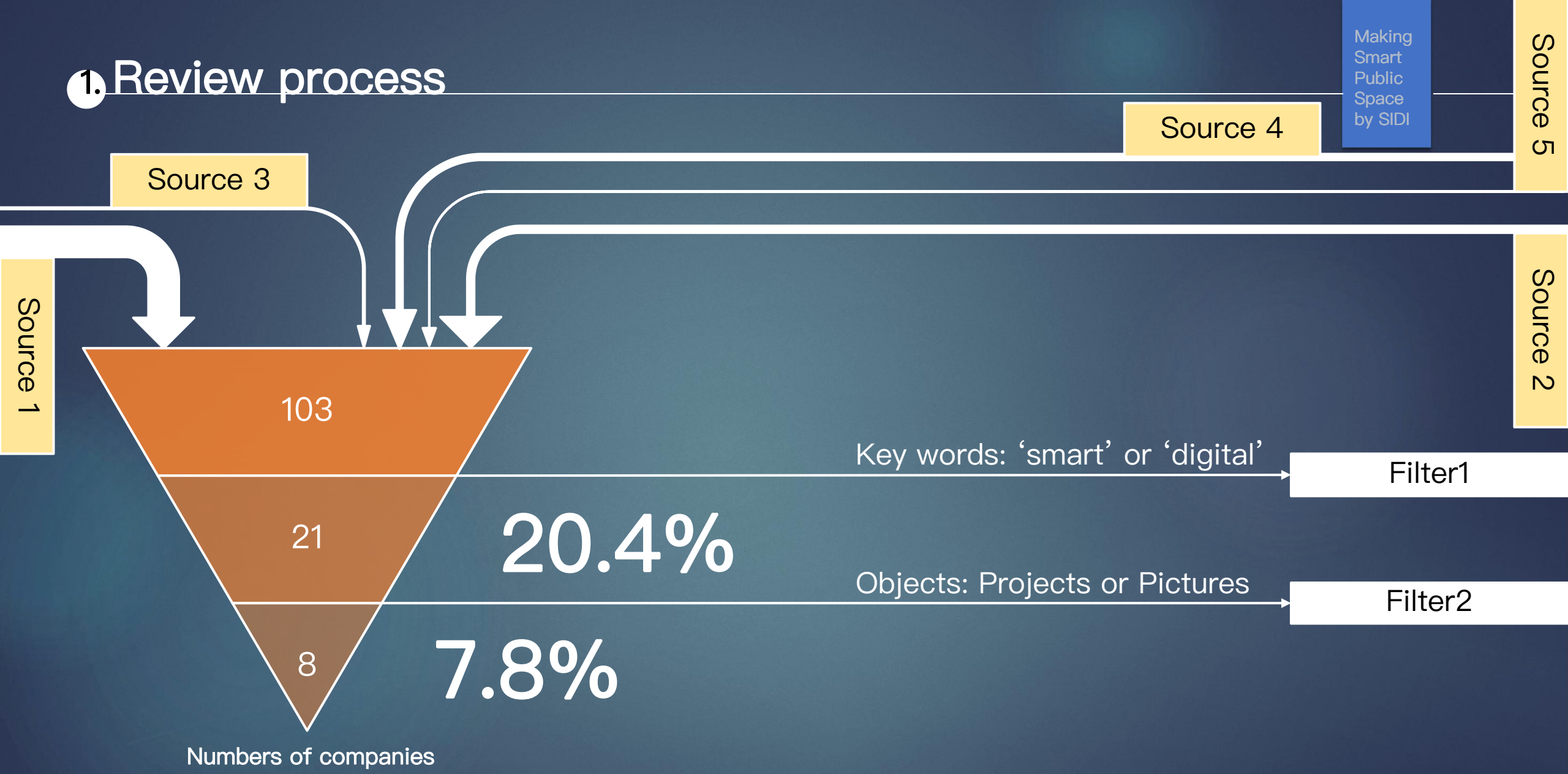
— a Review of Top 100 Design Companies

CHEN TONG, ENJIA ZHANG, YING LONG

5 JAN 2020

0. Contents

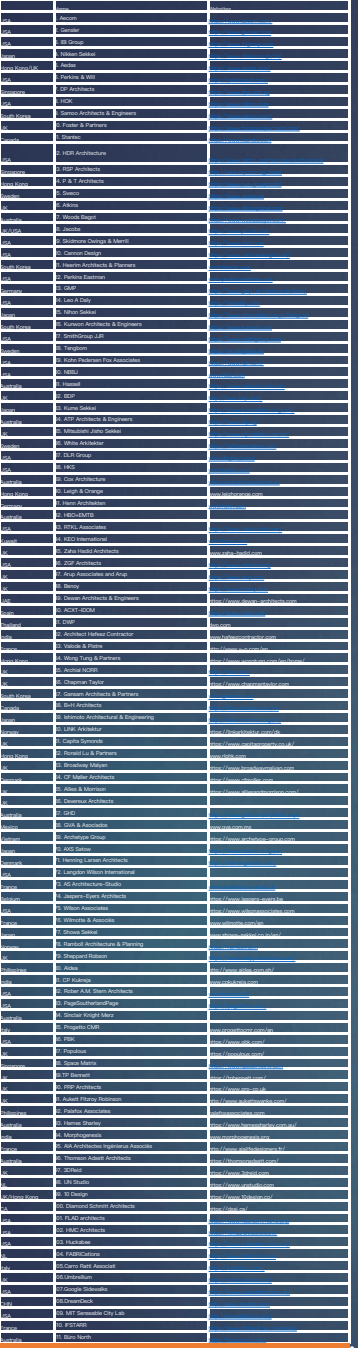
1. Review process



Source 1 https://architecturequote.com/blog/100-best-architecture-firms-in-the-world/
Source 2 https://www.bdonline.co.uk/wa-100
Source 3 research Institutes and technological companies
Source 4 Domestic design companies
Source 5 Twitter

2. Profile

USA	1. Aecom	@AECOM
USA	2. Gensler	@gensler_design
USA	3. IBI Group	@ibigroup
USA	8. HOK	@HOKNetwork
Canada	11. Stantec	@Stantec
USA	12. HDR Architecture	@HDRarchitecture
Sweden	15. Sweco	#sweco
UK	16. Atkins	@atkinsglobal
UK/USA	18. Jacobs	@JacobsConnects
USA	19. Skidmore Owings & Merrill	@SOM_Design
USA	24. Leo A Daly	@LeoADaly
Sweden	28. Tengbom	@tengbom
USA	29. Kohn Pedersen Fox Associates	@KohnPedersenFox
Australia	34. ATP Architects & Engineers	
USA	46. ZGF Architects	@ZGFArchitects
UK	47. Arup Associates	@ArupGroup
Spain	50. ACXT–IDOM	@IdomGroup
Denmark	71. Henning Larsen Architects	@HLArchitects
UK	79. Sheppard Robson	@SheppardRobson
UK	87. Populous	@Populous
NL	98. UN Studio	@UNStudio_Arch
NL	104. FABRICations	@FABRICations_nl
IT	105.Carro Ratti Associati	
UK	106. Umbrellium	@umbrellium
USA	107. Google Sidewalks	
China	108. DreamDeck	
USA	109. MIT Senseable City Lab	@SenseableCity
France	110. IFSTARR	
	111. Büro North	@BuroNorth



103+8

21+8

29 Companies

2. Profile

97 Projects

12 Countries

Country		Company	Project
USA		11	14
GBR		6	14
AUS		1	1
SWE		1	1
ESP		1	1
NED		2	13
DEN		1	1
CAN		1	1
AUT		1	1
ITA		1	10
CHN		1	9
FRA		1	1

P1 Queen Elizabeth Olympic Park

USA

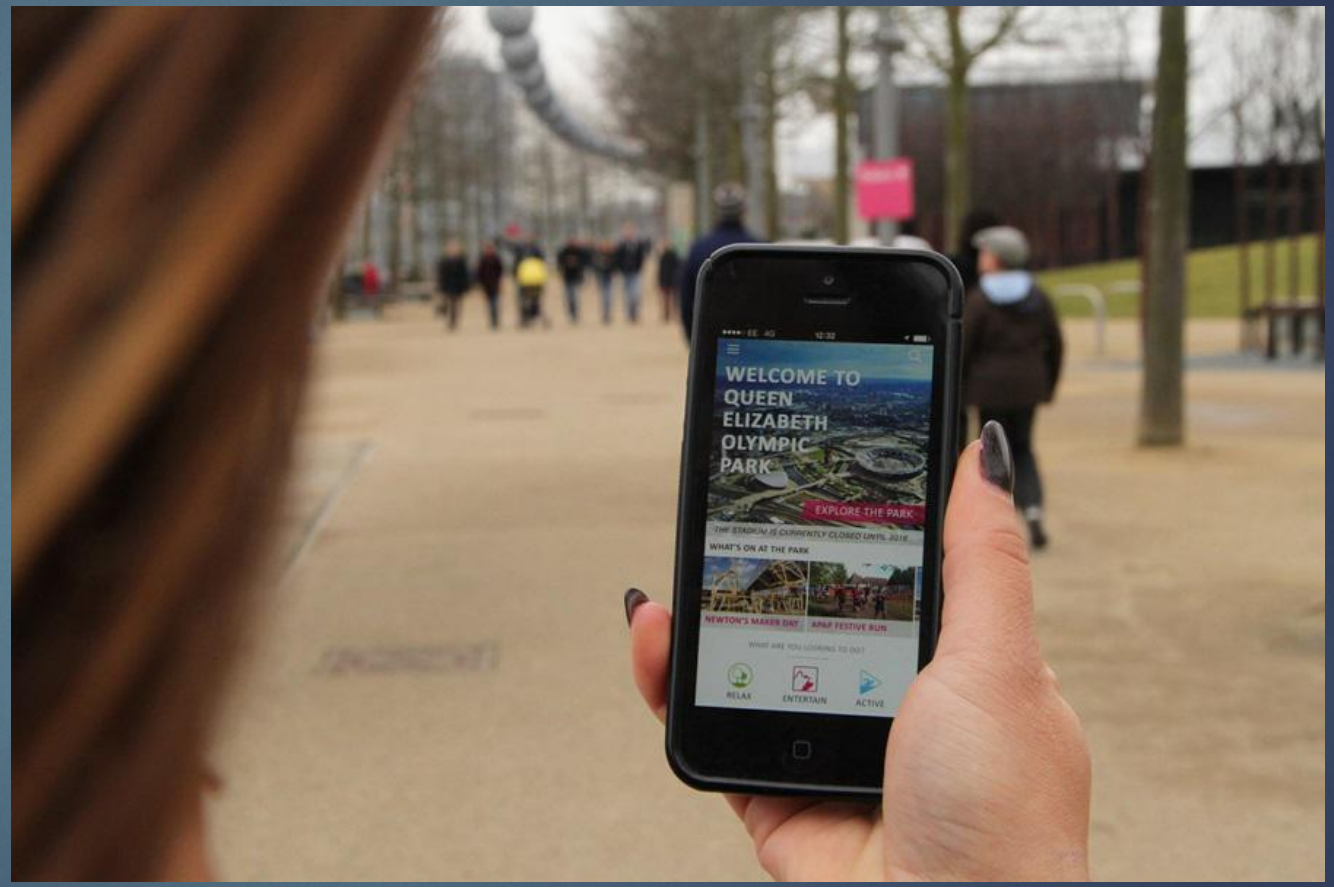
1. Aecom

https://www.aecom.com/

@AECOM

P1 Queen Elizabeth Olympic Park

Smart Park / Future Living – Implementing user facing digital and data solutions that deliver financial and CO2 efficiencies and prioritise quality of life improvements for those who live, work and visit the Park.



USA

2.Gensler

https://www.gensler.com

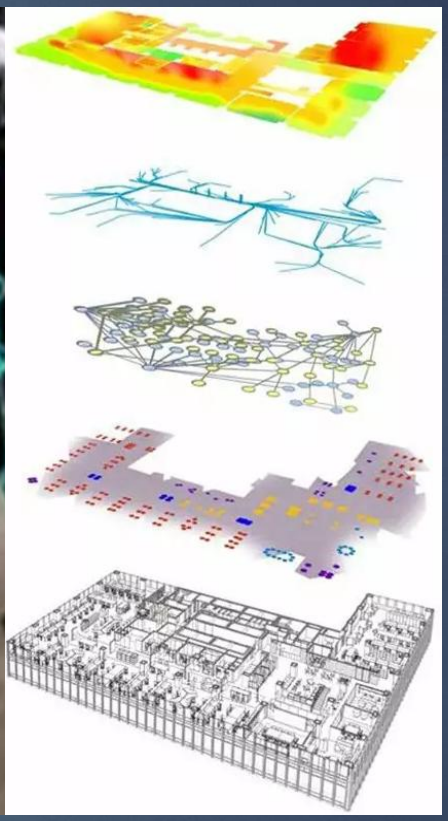
@gensler_design

3. Gensler

P1 IoT Sensor

一个由超过1500个传感器组成的网络，用以跟踪与空间环境相关的日光值、占用率、温度及能源消耗。我们的目标是给人们留出空间，而不是把人塞进空间。

我们引入了一个额外的占位感知、温度和动作捕捉功能，以更全面地探索我们随着时间变化如何工作、运转和适应空间——最终提高了Gensler在如何将数据应用于人性化设计方面的专业技能。



3. Gensler

P2 FLOAT NYC

FLOAT NYC is a passenger cruise on a 105–foot–high buoyant float structure, capable of hosting television and film screenings on its facade.

3. Gensler

P3 Digital Experience Design

Gensler's Digital Experience Design (DXD) practice connects the worlds of physical and digital design by delivering holistic strategies and integrated designs for the built environment.

USA

3. IBI Group

https://www.ibigroup.com

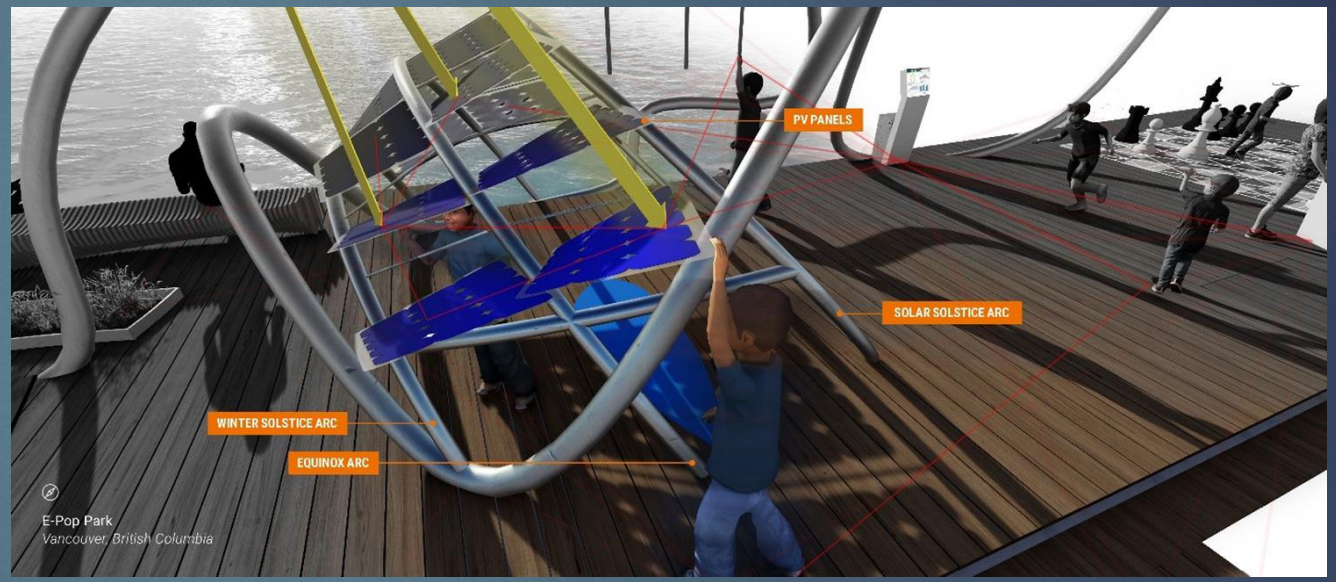
@ibigroup

P1 IBI Mobility+

IBI Mobility+ is a centre of excellence that taps into new technologies and community intelligence to design choice and convenience into the urban journey, enabling a **connected future** for cities and their residents.

P2 Interactive Installation

Teaching sustainability and energy conservation through play.



P3 Digitally illuminating a city's utilization

For the Pittsburgh revitalization project, we pumped all the city's data into a 3D model, which we programmed to illustrate utilization over time on a typical day. As the information changes over time, the data drives animation within the 3D model in forms of color, motion, etc.

How many people are going where?

Which storefronts are vacant? Which are active?

What's the traffic count through the area?

P1 Smart Mobility

P2 Transforming Visitors to Artists & Performers

USA

8. HOK

https://www.hdrinc.com

@HOKNetwork

P1 Smart Mobility

Emerging transportation technology represents a significant opportunity for infrastructure owners, operators and travellers to experience greatly improved safety and mobility, and reduced congestion. While that's good news, transportation planners, engineers and system managers need to identify a smart path forward that avoids one-time technology blips when investing in those technologies. Long-term success will depend on implementing the right intelligent transportation systems and emerging technologies that not only improve system operation, but also improve a community's quality of life.

P2 Transforming Visitors to Artists & Performers

Interactive media is used to organize participant activity.

P1 Quasyside District Waterfront Toronto

P2 Virtual Infrastructure

USA

11. Stantec

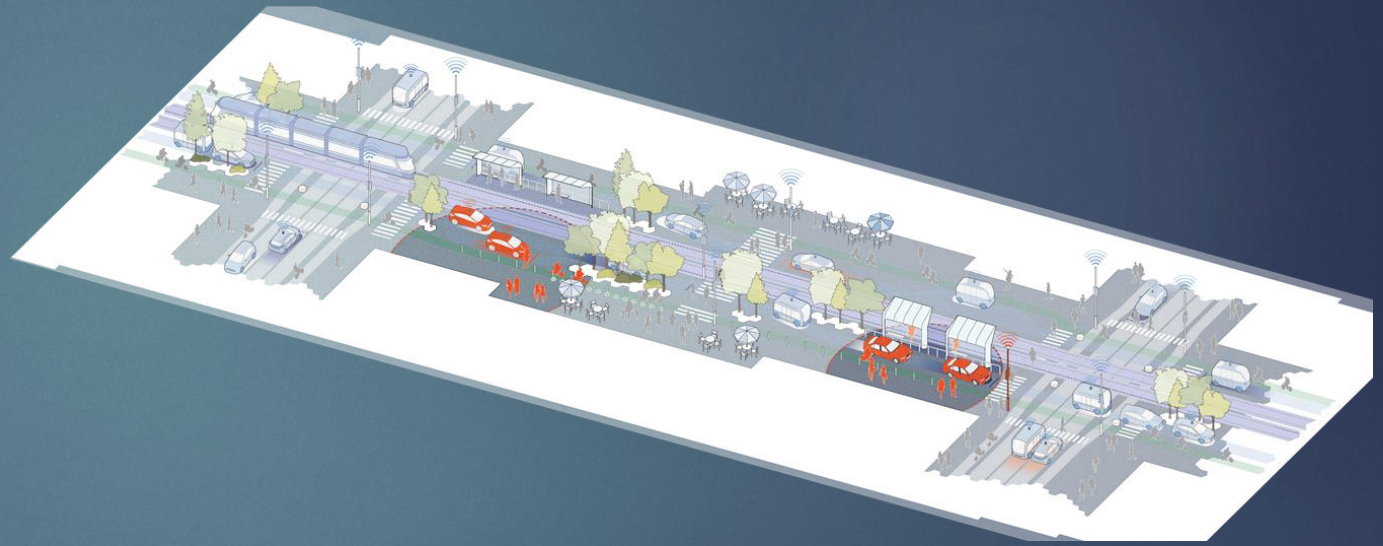
https://www.stantec.com/

@Stantec

3. Stantec

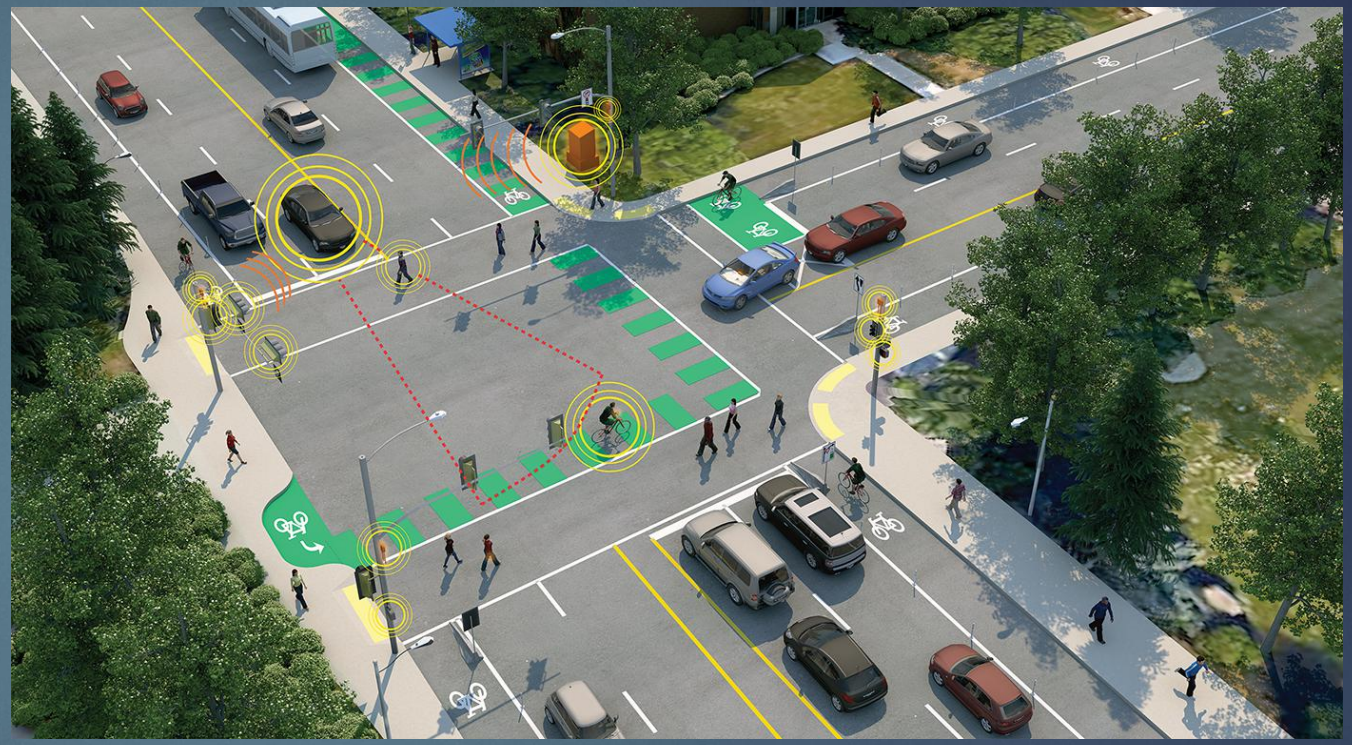
P1 Quasyside District Waterfront Toronto

The Quayside plan takes AVs, taxi bots, microtransit vehicles, and mass transit into account within its basic framework, making it easier for households to meet their mobility needs. Sometimes called ‘Mobility–as–a–Service’, people in Quayside will be able to plan their trip in real–time via integrated apps and information kiosks.



P2 Virtual Infrastructure

A virtual technology can typically be developed and deployed in a fraction of the time—and potentially have a far greater reach—than conventional physical infrastructure.



P1 Auditon

USA

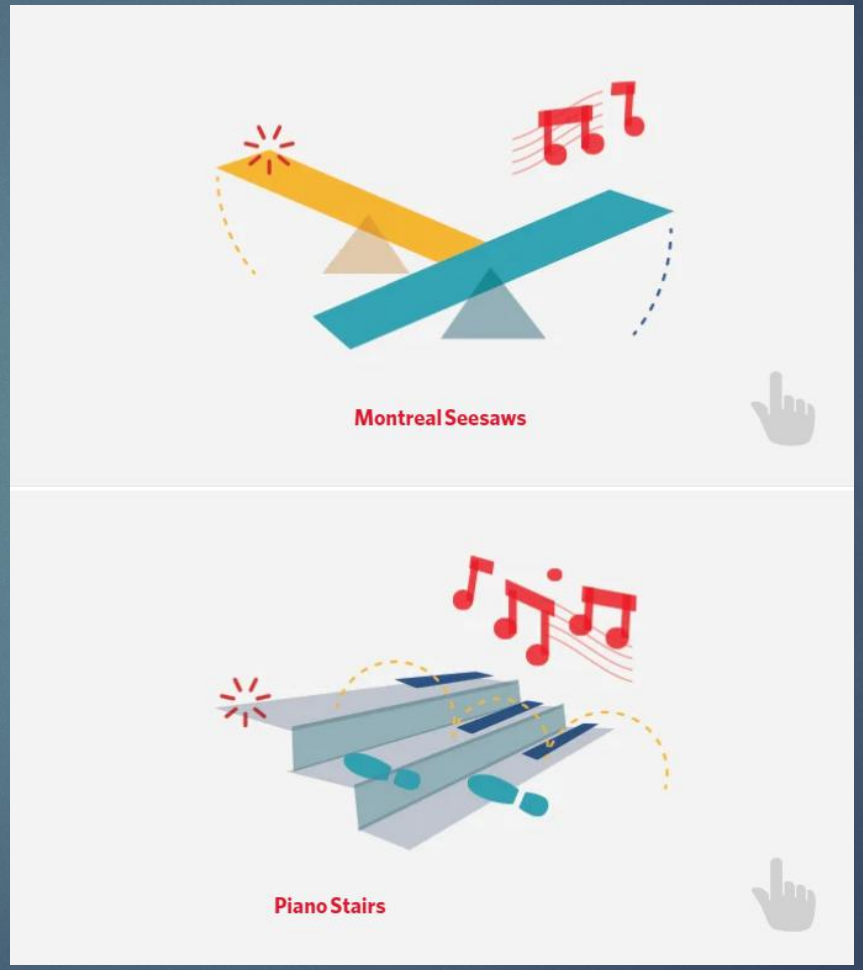
12. HDR Architecture

https://www.hdrinc.com/services/architecture
@HDRarchitecture

3. HDR Architecture

P1 Auditon

Interactive installation can play music.



P1 Smart Solutions

SWE

15. Sweco

https://www.sweco.se

#sweco

P1 Smart Solutions

Examples of smart city solutions can include everything from smart power grids that balance loads and reduce energy consumption to high–efficiency public transport networks where the routes are optimised with the help of large volumes of traffic data. They can also include automated and resource–conscious waste management and energy–saving lighting that shuts off when everyone has left the office

UK

16. Atkins

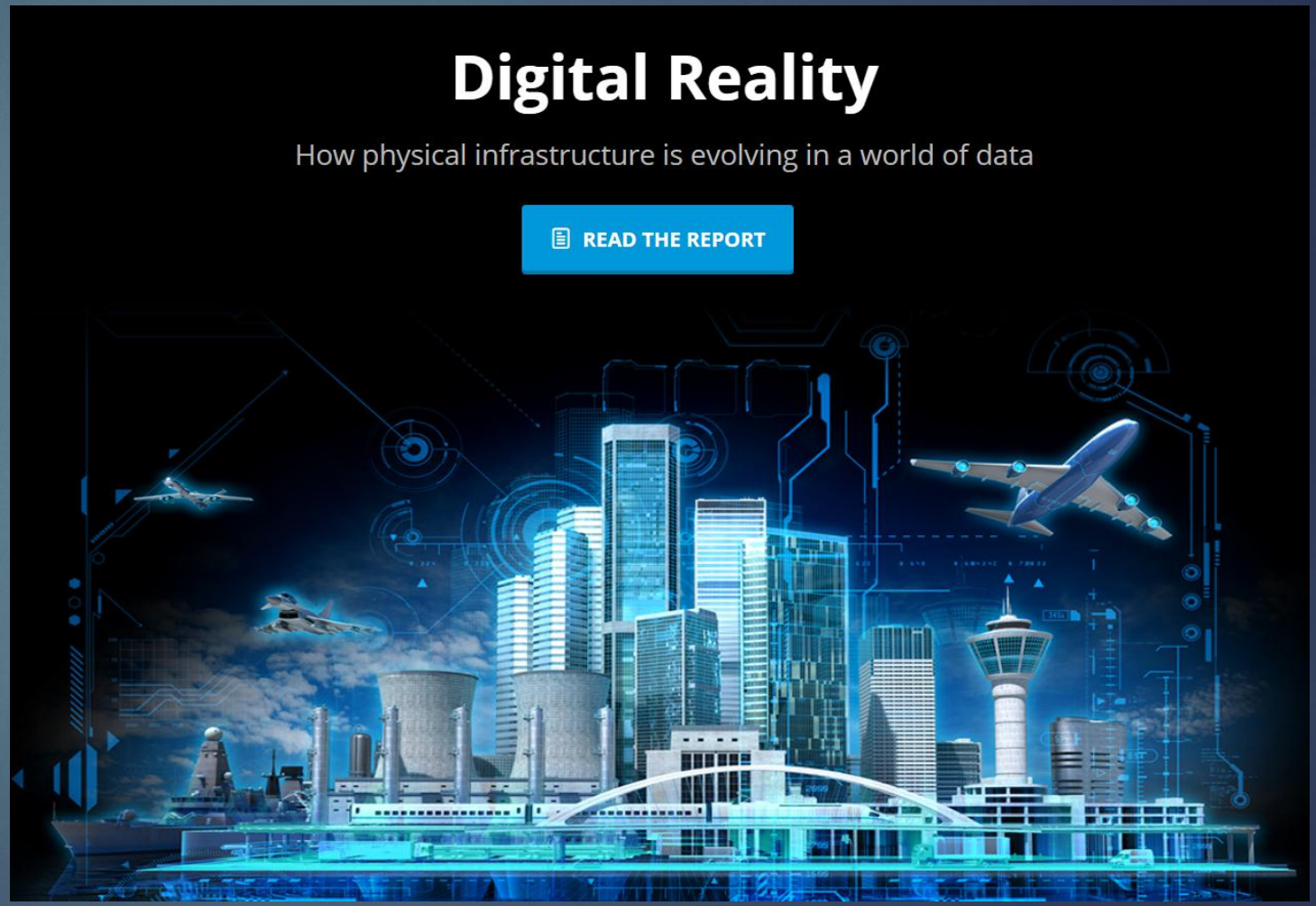
https://www.atkinsglobal.com

@atkinsglobal

P1 Digital Reality

It integrated new technologies, use of data and augmented reality with public space improvements, green strategies and the necessary infrastructure to deliver high speed wifi, bluetooth as well as the more conventional benefits of good street lighting.

To ride the wave of digitalisation we are seeing across industries and maximise these opportunities, we'll need to adopt a new mindset and developing new capabilities.



P2 Digital Infrastructure

By making use of virtual reality, we can mark out new pipe and cable routes on a virtual twin of the site and then transpose them directly into design software.

P3 Smart Ecology

Over the last 20 years, we've seen a move away from identifying ecological impacts at the last minute and then trying to shoe-horn appropriate mitigation into the well advanced, detailed engineering design of a major infrastructure scheme, to a more iterative approach.

P4 J30 Smart Motorway

The design includes the use of Dynamic Hard shoulder Running and All Lane Running (ALR), where the existing hard shoulder is converted into a running lane.

UK

18. Jacobs

https://www.jacobs.com

@JacobsConnects

P1 Smart Mobility

With the Internet of Things and Industry 4.0 digital revolution challenging planners, cities and their infrastructure owners to make systems smarter and more resilient, while also accounting for future urbanization, we are at a pivotal moment in mobility across markets.

P2 Smart City

The city's state-of-the-art smart technologies, along with its sustainable infrastructure focused on clean, reusable and recycling methodologies, serves as a model for growing the country's technological depth in manufacturing, while providing new opportunities for helping people across geographies to compete, collaborate and co-create a better future for all.

3. Jacobs

P3 How Edinburgh is Putting People at The Heart of its City Design

A “big picture” strategic approach to develop integrated infrastructure — physical and digital — that address multiple considerations.

Being smart is about more than sensors, Wi-Fi hotspots and the Internet of Things (IoT). Smart means using technology to inform strategy, taking an evidence-based approach and developing connected solutions that are focused on improving the quality of life.

P4 The Nature Conservancy

The Nature Conservancy released to the public today, at the peak of the Atlantic hurricane season, a ground breaking case study that provides a preliminary, comprehensive evaluation of how nature–based defenses, in conjunction with gray solutions, can effectively be used to protect communities in New York City and around the globe from the impacts of climate change.

The Nature Conservancy included installation of vegetation and sediment filled baskets to deter, coil logs filled with rock and coconut fibers, as well as sediment compaction and revegetation with robust clonal species adapted to water depth and energy forces.

USA

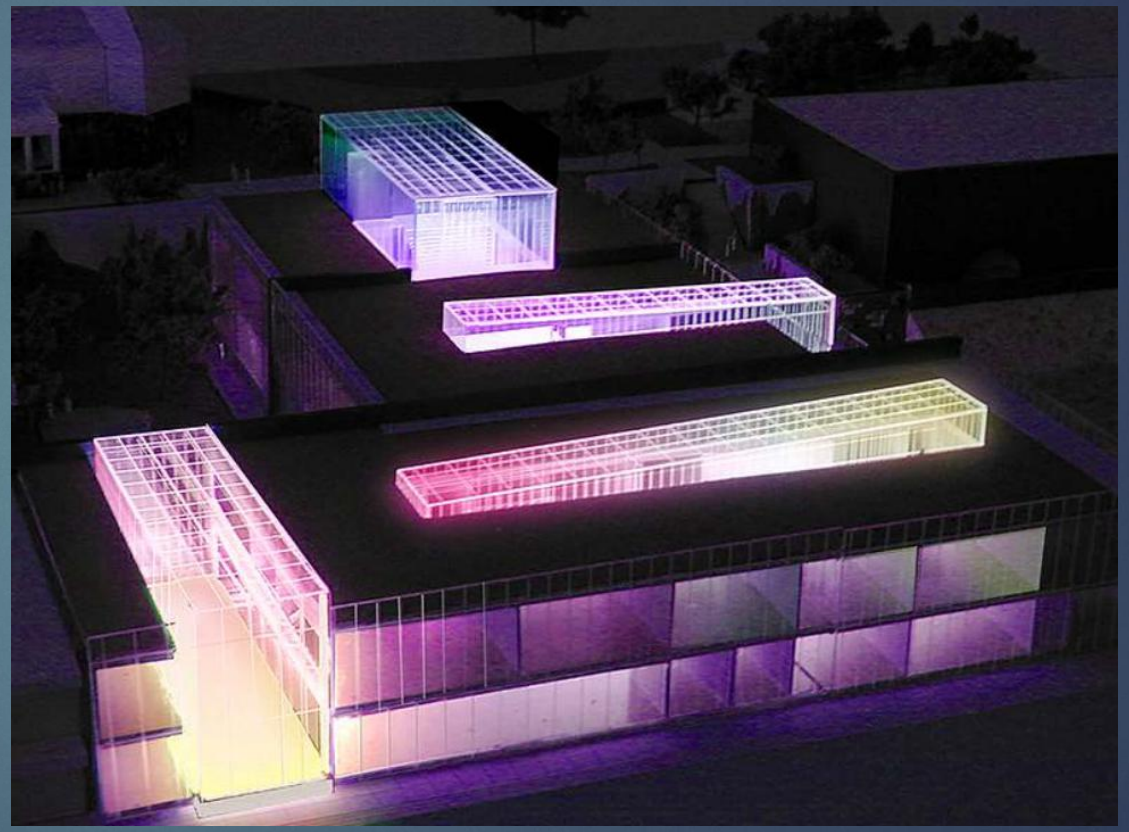
19. Skidmore Owings & Merrill

https://www.som.com

@SOM_Design

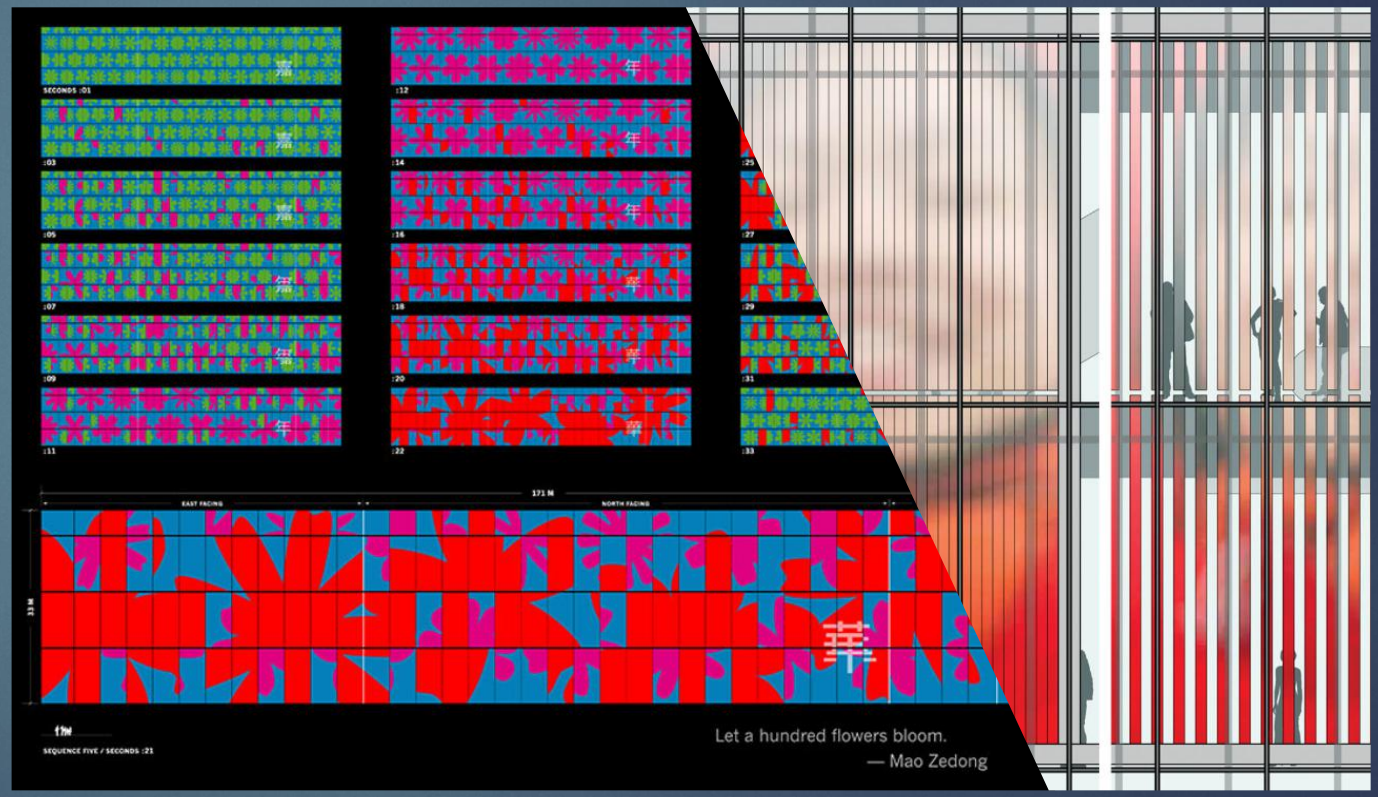
P1 Light Cell

Dynamic light in LED belts reflects connections among different subjects.



P2 Dynamic façades

Dynamic façades made of 148 rotating panels are controlled by coding programs.

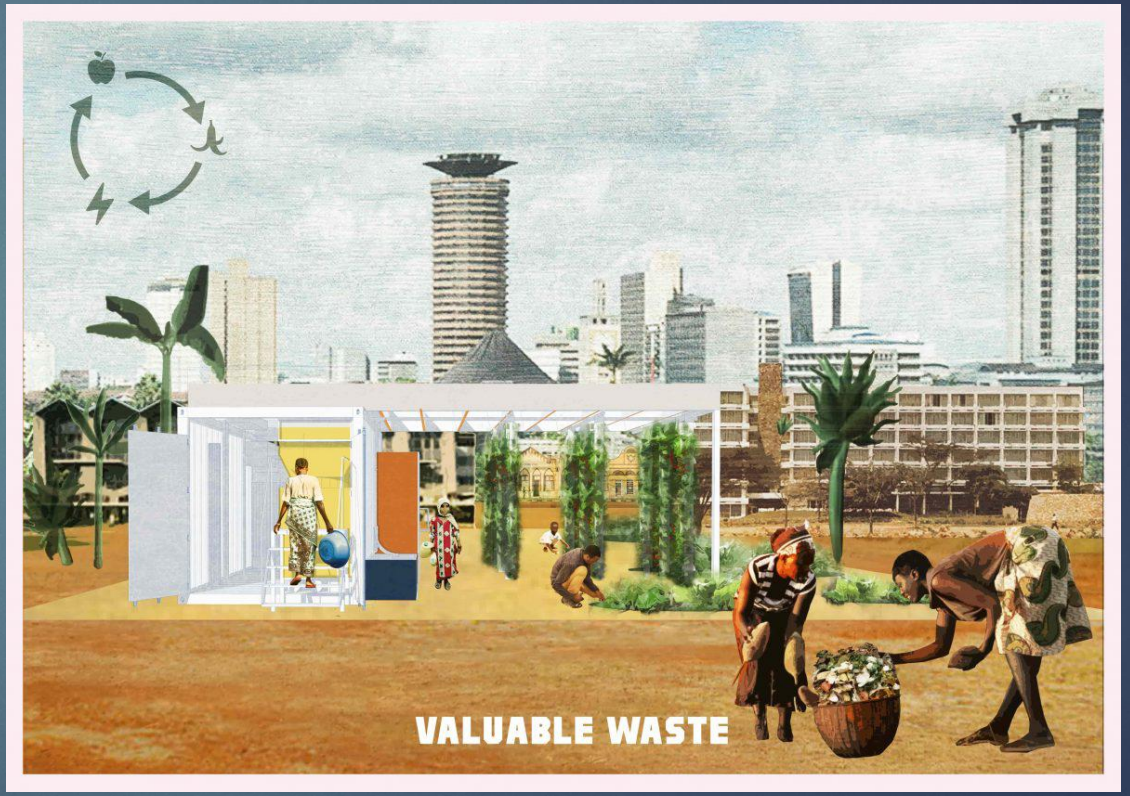


P3 M4 Motor Road

Lighting the way for smart city services

P4 Urban Farm

An urban farm in the neighbourhood with a circular energy transformation.



P1 Bridging the analog–digital gap in healthcare

USA

24. Leo A Daly

https://leoadaly.com

@LeoADaly

3. Leo A Daly

P1 Bridging the analog–digital gap in healthcare

Many of the most exciting technologies right now bridge the analog–digital gap, bringing human beings and technology together in new ways. Augmented Reality and Virtual Reality (AR/VR) are helping designers better understand their end users.

Making Smart Public Space by SIDI

P1 Smart Functions

SWE

28. Tengbom

https://en.tengbom.se

@tengbom

3. Tengbom

P1 Smart Functions

Open, light and spacious, the properties have an open plan layout, with residents benefiting from smart functions such as wireless audio systems in the apartments, carpools and charging stations for electric vehicles.

USA

29. Kohn Pedersen Fox Associates

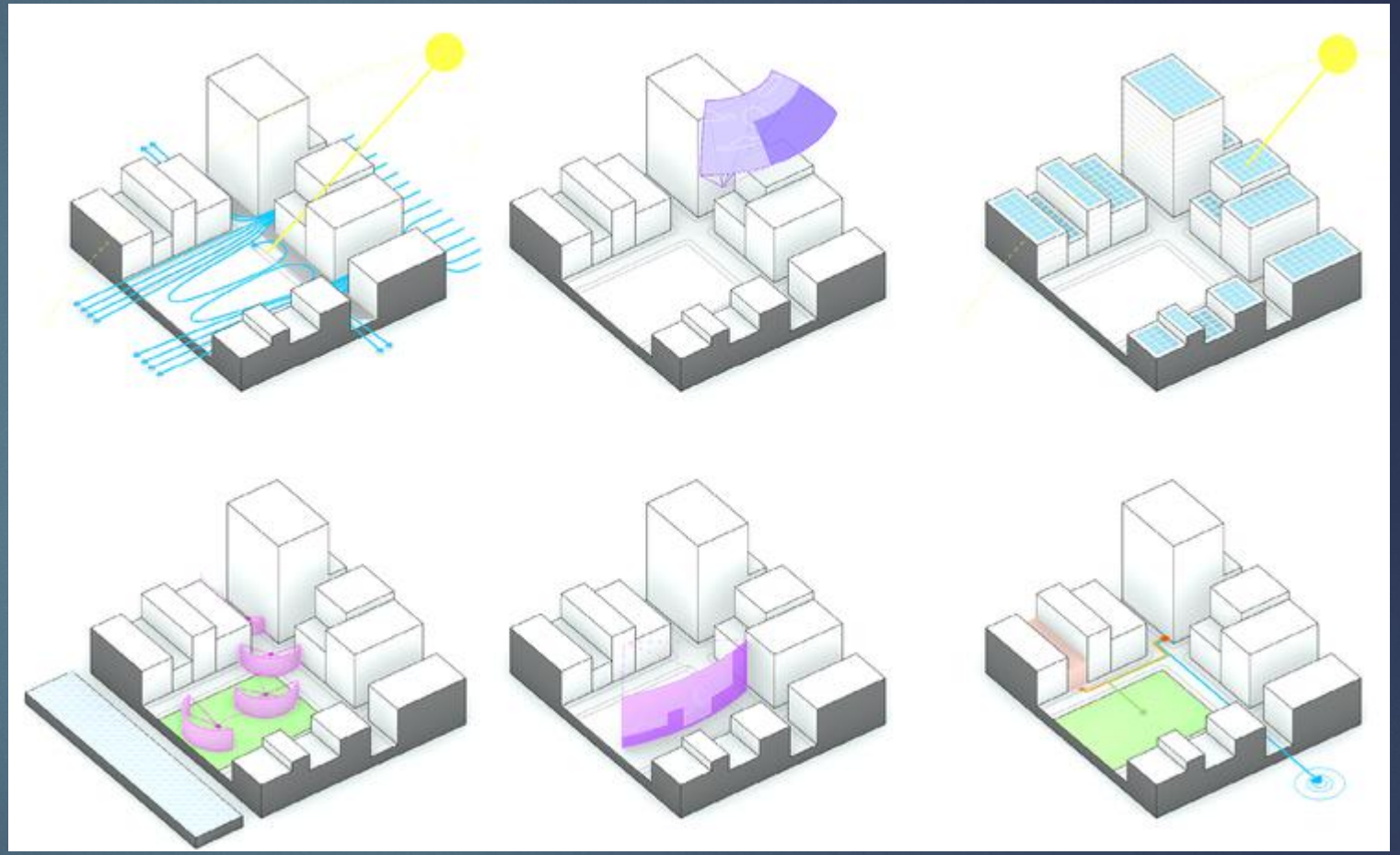
https://www.kpf.com/

@KohnPedersenFox

3. Kohn Pedersen Fox Associates

P1 KPFui

KPFui has developed bespoke analysis tools to measure almost anything, from views, to daylight, comfort, sky exposure, solar radiation, wind, energy efficiency, visibility of buildings from/to landmarks, access to parks and transit, mobility, and even subjective characteristics like “visual interest”.



P1 Integral Planning

AUS

04. ATH
Architects & Engineers

https://www.kumesekkei.co.jp/en/

3. ATP Architects & Engineers

P1 Integral Planning

Many of the most exciting technologies right now bridge the analog–digital gap, bringing human beings and technology together in new ways. Augmented Reality and Virtual Reality (AR/VR) are helping designers better understand their end users. Internet of Things (IoT) devices are connecting patients and providers. And telemedicine is improving access to care for a variety of populations.

P1 Ecosystems

USA

46. ZGF Architects

https://www.sfmoma.org

@ZGFArchitects

3. ZGF Architects

P1 Ecosystems

Through cooperation and innovation in technology, financing, and strategic integration of all the moving parts and players, cities are scaling towards true sustainability. Just as natural systems adapt and refine functions to stay dynamic, so too must city–systems, which requires the insight of a multi–dimensional partner ecosystem.

UK

47. Arup Associates

https://www.arup.com

@ArupGroup

P1 Digital cities

1. Improving public engagement and local governance through digital technology.

2. Buildings no longer need to be stand–alone structures in a city, they can talk to other infrastructure, transport, neighbouring places, and most importantly, people.

P2 Hong Kong Smart District

- 智慧人流管理系统
- 按个人特性及喜好提供的行人能源效率
- 路旁上落货区监测系统
- 智慧回收箱系统
- 多功能路灯
- 实时道路工程资讯
- 违例泊车监察系统

P3 Human interaction in smart city design

Many Thoughts articles identify the value of space to human interaction and the role of grit and chance in making cities attractive. But in a world in which ‘smart’ is the buzz word and efficiency is (rightly) a principle to strive for, we run the risk of losing the opportunity for real social encounters.

P4 Sensing Cities

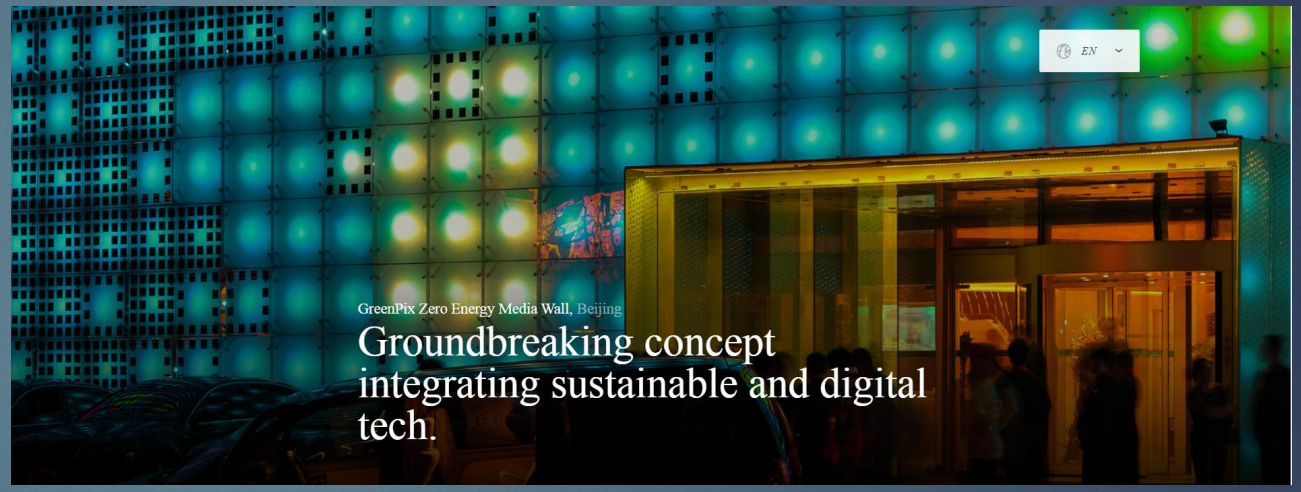
Sensing City is a world–first project which will see sensors installed in Christchurch to collect real–time information about how a city actually works.

P5 Autonomous buildings

The building may know what you needA before you want it, helping to save money and fight climate change — all on its own.

P6 The GreenPix media wall

It performs as a self–sufficient organic system, storing solar energy by day and using it to illuminate the screen after dark.



ESP

50. ACXT–IDOM

https://www.idom.com

@IdomGroup

3. ACXT–IDOM

P1 CREATIVE DIGITAL CITY

The city of Guadalajara (the State of Jalisco, Mexico) is promoting the “Creative Digital City”, a plan to renovate the historic centre of the city, creating an interconnected urban environment where creative industries can be set up such as film production, television, video games, digital animation, interactive media, and mobile device applications, to name but a few.

P1 Sounds in Virtual Reality Will Improve Acoustical Design

DEN

71. Henning Larsen Architects

https://henninglarsen.com/

@HLArchitects

3. Henning Larsen Architects

P1 Sounds in Virtual Reality Will Improve Acoustical Design

In the new VR lab at Henning Larsen Architects, it is now possible to implement sounds in the mix. When realistic 3D sounds are added, it gives an extra dimension and makes the immersion into the virtual space significantly more convincing. It means that with the technology of the lab and VR goggles on, you can physically move around and experience a fictional acoustics setting.

P1 Diagonal

UK

79. Sheppard Robson

https://www.sheppardrobson.com/

@SheppardRobson

3. Sheppard Robson

P1 Diagonal

Building on the South Dalmarnock Integrated Urban Infrastructure, Sheppard Robson developed design solutions for some of the key public spaces and pedestrian routes. New streets that meet functional operational needs of vehicle usage, along with safe pedestrian and cycle routes and on road Sustainable Drainage Strategies(SUDs) strategies for adoption.

UK

87. Populous

https://populous.com/

@Populous

3. Populous

P1 The future of sports

- Wearable, data-recoding technology brings fans and athletes closer together.
- The rising popularity of eSports poses the opportunity of creating a physical space for a digital event. Virtual and augmented reality, demountable venues, and smart technology are all factors in bringing eSports to the mainstream stage as a new force in sports.

98. UN Studio

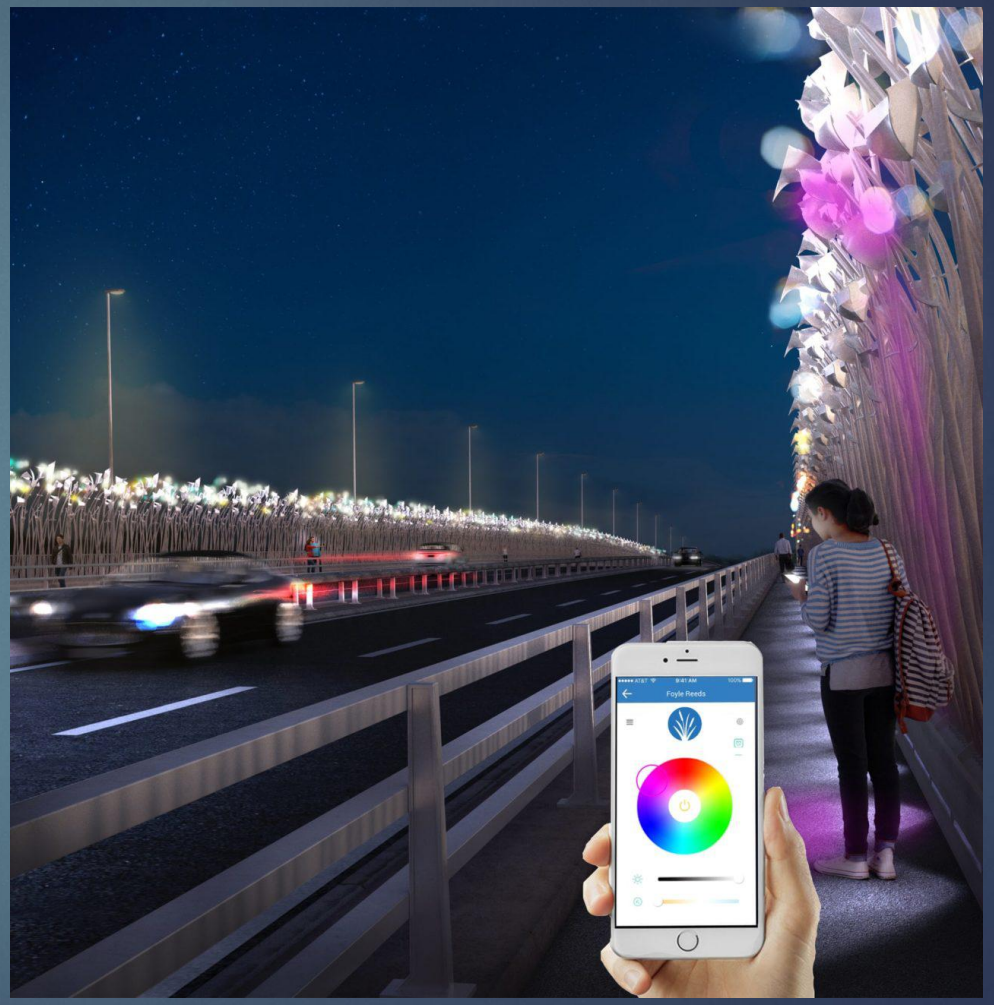
https://www.unstudio.com

@UNStudio_Arch

3. UNStudio

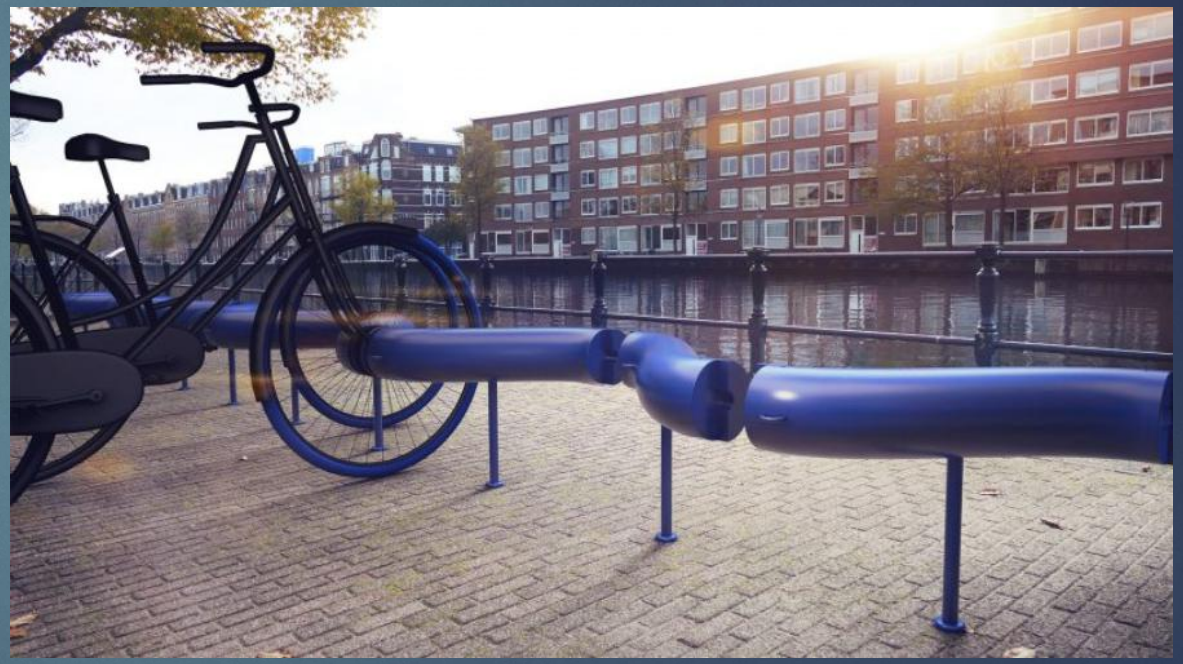
P1 Art Installation

The city uses interactive installations produced with artists, musicians and students along the riverfront and over the Peace Bridge to improve how people engaged with the space.



P2 S–Park

S–Park is the world's first system that lets bicycles generate electricity. The technology gives a further sustainable dimension to this modal choice already much admired by many Amsterdammers.



P3 A10 ring road

A new multimodal transport hub located on the intersection between Cornelis Lelylaan and the A10, and new urban development on both sides of the A10 road that link the adjacent neighbourhoods.

- Driverless CityPods
- Micro–scale energy storage and supply centre
- Circularity and efficient energy exchange in order to support and benefit the community surrounding the Hubs.

3. UNStudio

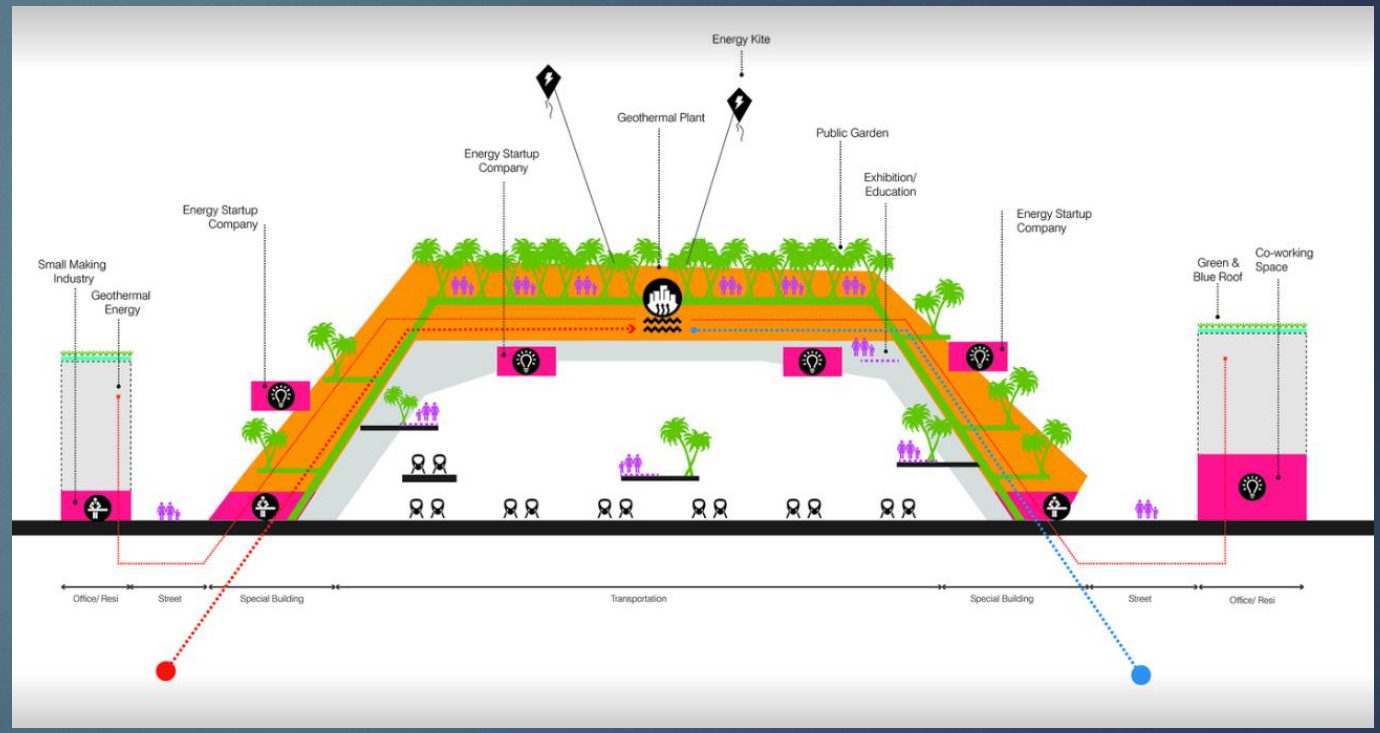
P4 CityTrees

Amsterdam and Eindhoven planted CityTrees, artificial trees that filter polluted air.

3. UNStudio

P5 Gateway

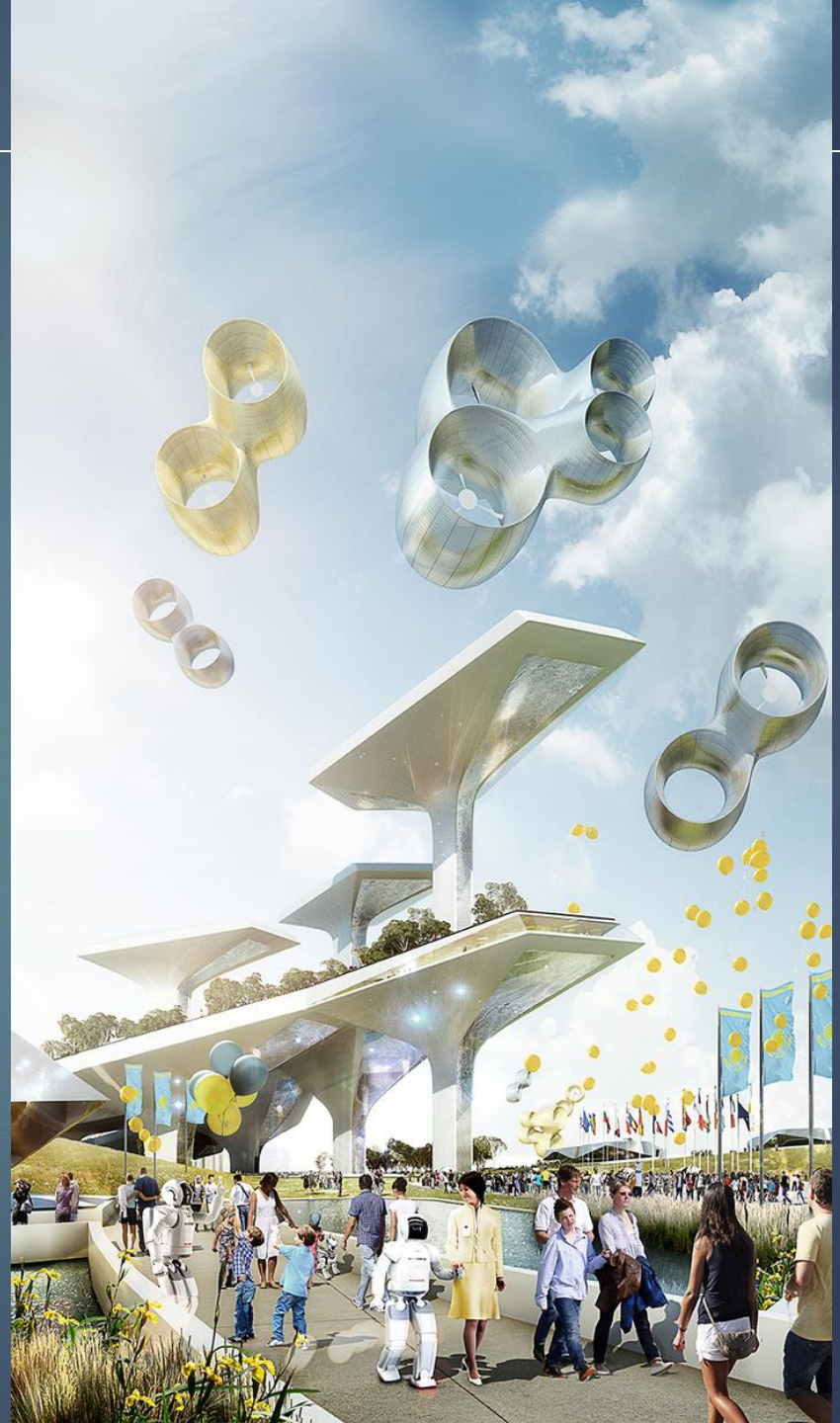
Physical architectural interventions that create practical solutions to energy, circularity, mobility, climate adaptation, water management and food production. BLOOM: It harvests and supplies energy, filters water and offers technology to create interactive experiences.



3. UNStudio

P6 Water towers and the turbine kites

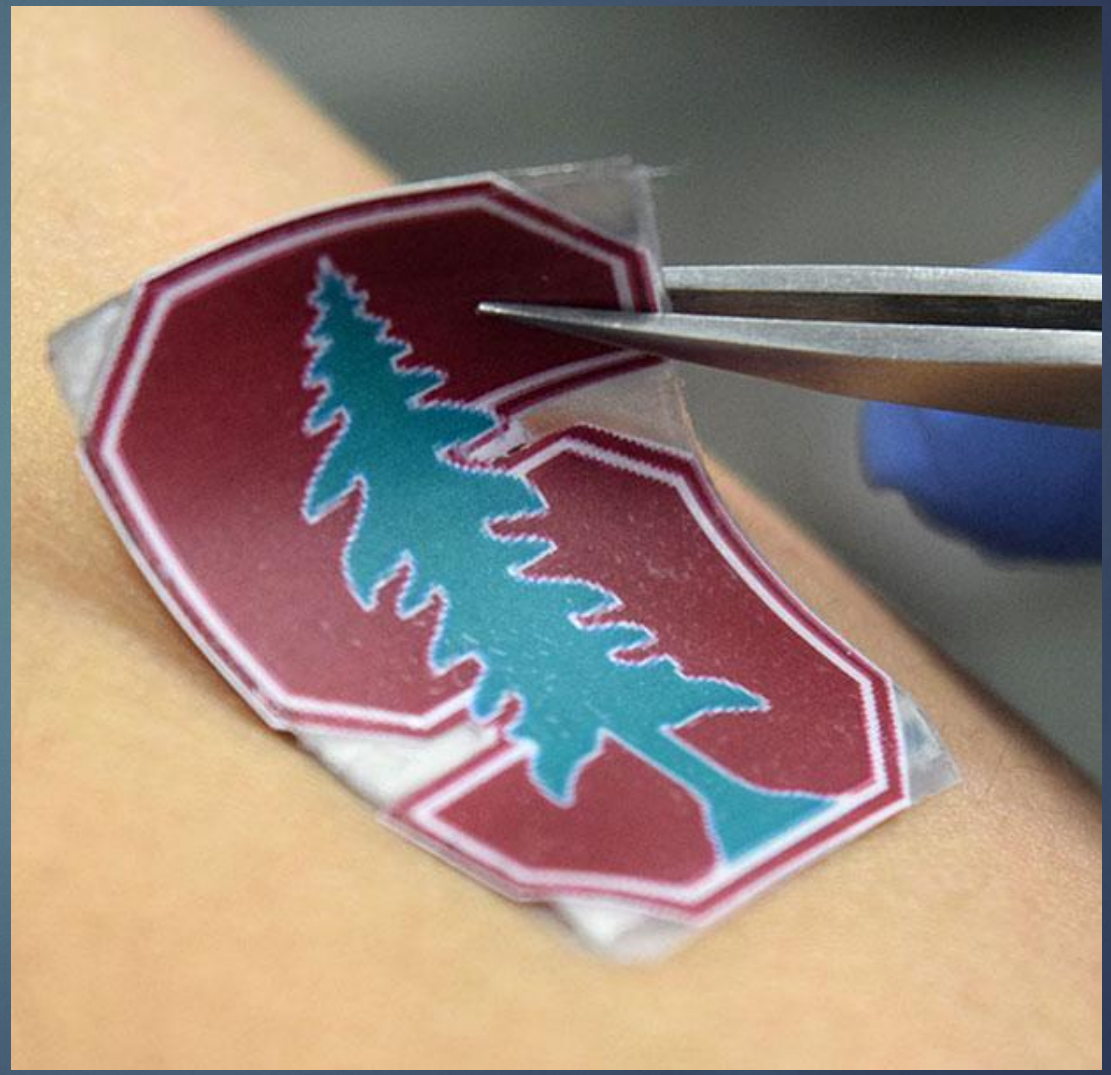
Combined with high efficiency PV arrays they will generate electricity and demonstrate the integration of technique and design.



3. UNStudio

P7 Health Patch

A wearable patch that is able to provide instant and accurate measurement of stress by checking the levels of Cortisol, the stress hormone, in sweat.



P8 Autonomous Vehicle

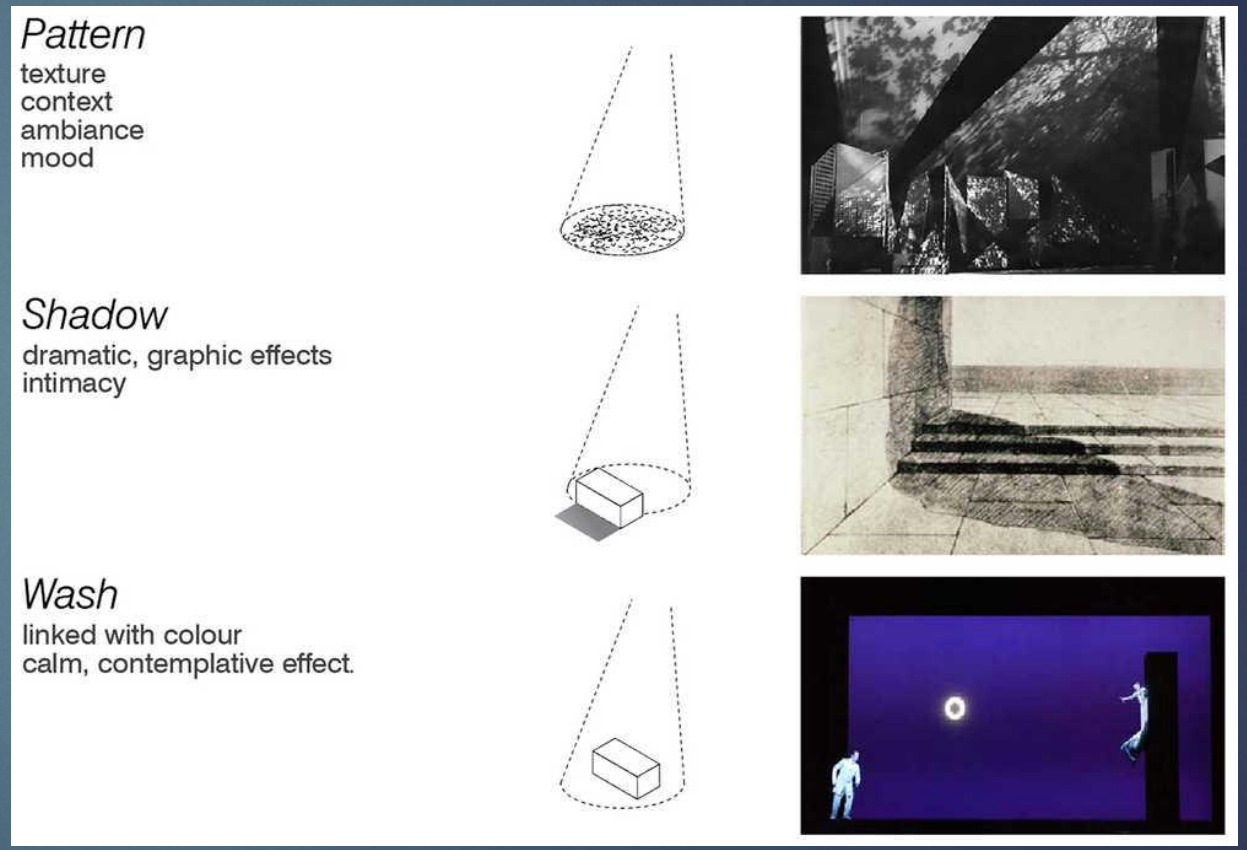
Volvo presented its vision on the future of its fully autonomous car, which fits into the broader scheme of city infrastructure, short-haul flights, working commutes, and environmental concerns.

P9 Lightpole

Light serves as both a suggestive tool that influences the flow of pedestrian traffic as well as a wayfinding solution.

P10 Shadow

It is the play between light and shade that manifests visual interest and curiosity.



P11 Sensitive light

Sensitive and precise layers of lighting can generate coherent and enjoyable spaces that encourage human activity.

More intense light can even have the capacity to trigger more intense emotional responses.

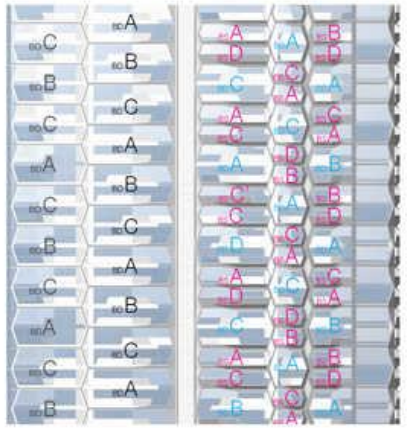
3. UNStudio

P12 Solar bricks

The innovative combination of full colour print and high efficiency photovoltaic material make the Solar Visuals panels smart, efficient and visually attractive at once.

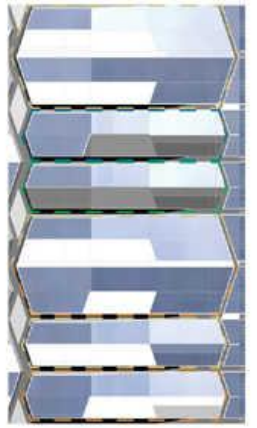
P13 Responsive facade

This is the foundation of a responsive architecture; one that facilitates audience participation and empathic user engagement as essential factors in a healthy society and resilient cities.



RESIDENTIAL UNITS STACKING MATRIX
LOWER TOWER

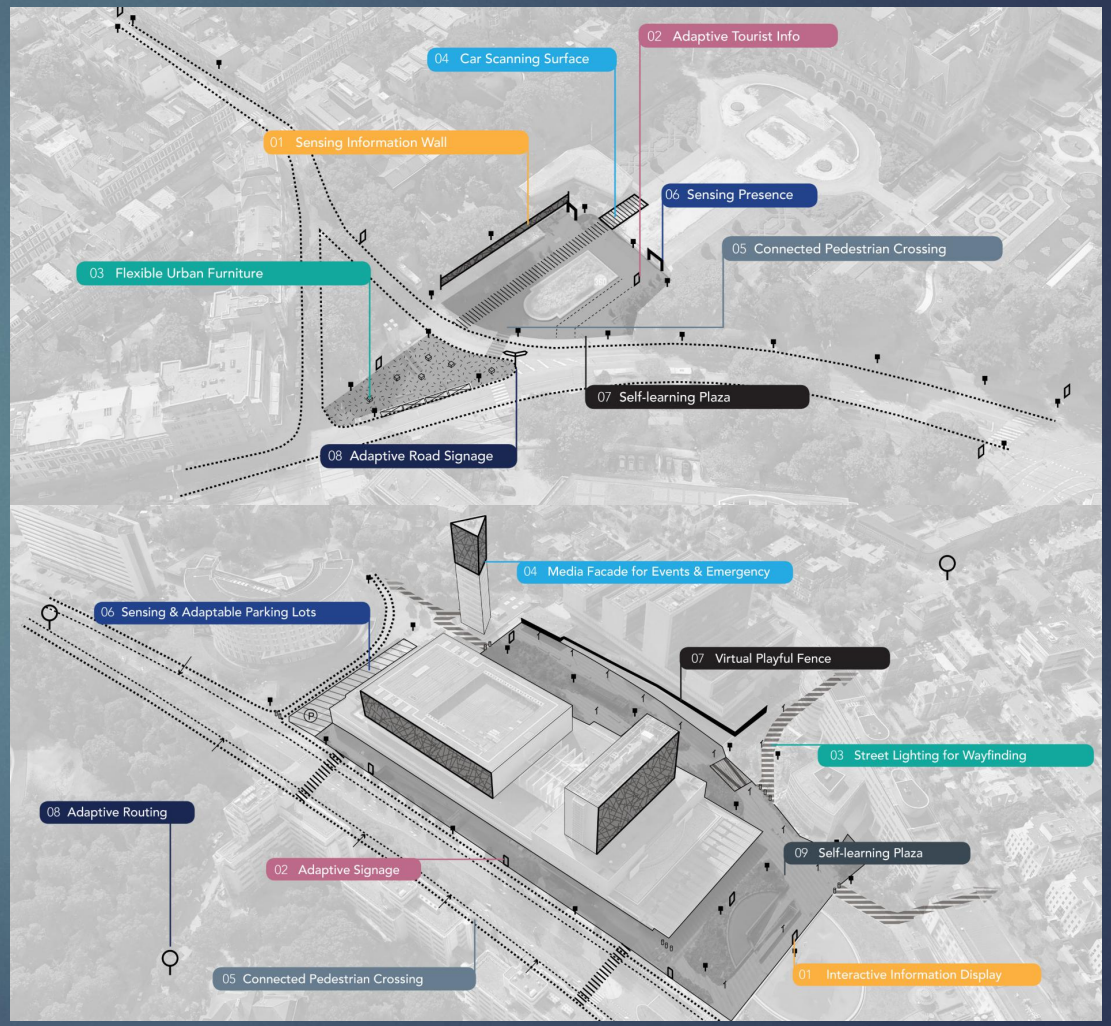
ZOOM IN ON REPEATING STACK OF EIGHT UNITS



P14 International Criminal Court

Interactive infrastructures: With adaptable signs, flexible bollards and connected traffic lights, the zone will react in real time to its ever–changing requirements. With flexible parking lots and curbs, we propose adaptable roads around the neighbourhood. If during an event a road closure is required, a parallel road widens up and takes over the traffic. Sensors will tell us just how successful this redirection is, and will update the road signs and navigation systems in time for the drivers not to notice too much.

- Design for Everyday use
- Design for an Event
- Design for an Emergency



Making Smart Public Space by SIDI

P1 Sensory SURFACE

P2 ENERGY & SPACE

P3 AR Stadium

104. FABRICations

https://www.fabrications.nl

@FABRICations_nl

3. FABRICations

P1 Sensory SURFACE

Ara playing with the sensory SURFACE | stretch COLOR prototype, where pressure applied to the 2D textile determines the color being projected onto the surface.

P2 ENERGY & SPACE

A circular network from power plants to (chemical) industry to greenhouses to city district heating, connected to decentralized thermal energy storages and geothermal sources, would make effective use of our current energy resources.

3. FABRICations

P3 AR Stadium

Utilizing Augment Reality in sports live.

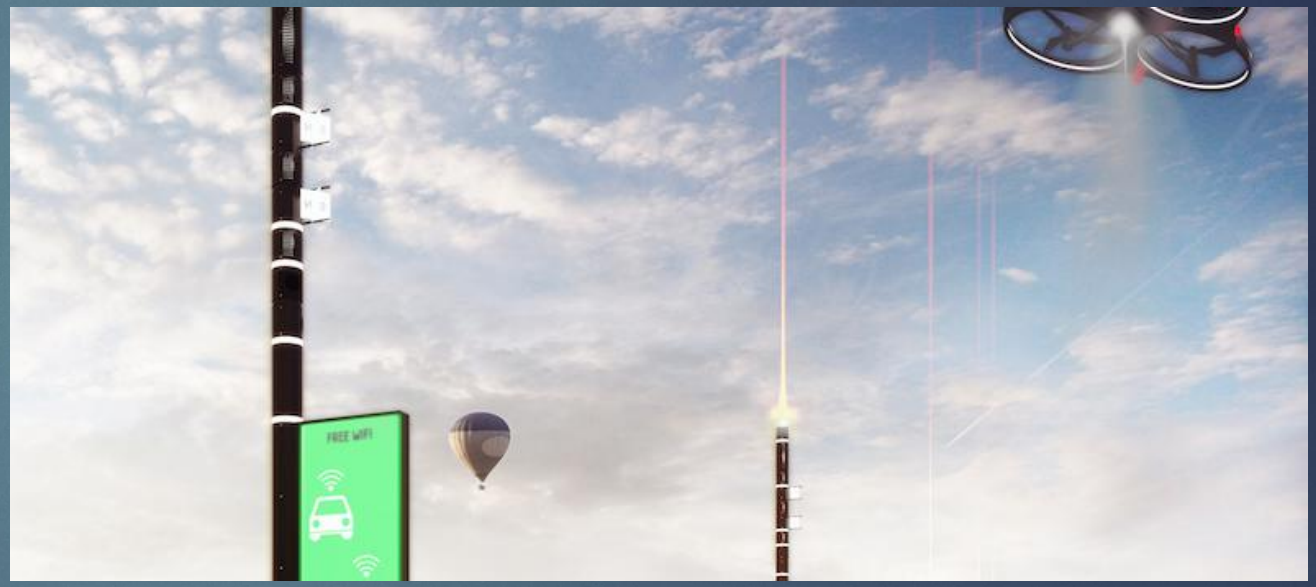
105.Carro Ratti Associati

https://carloratti.com/

3. Carlo Ratti Associati

P1 Anas Smart Road

The project involves a pioneering infrastructure system featuring drones that are able to deliver first-aid support, as well as sensing poles that can send useful information to both today's drivers and tomorrow's self-driving vehicles.



3. Carlo Ratti Associati

P2 Makr Shakr

Through a mobile app, users can browse, design and order an almost limitless amount of cocktail combinations which are then assembled by two shaker–handed robotic arms.

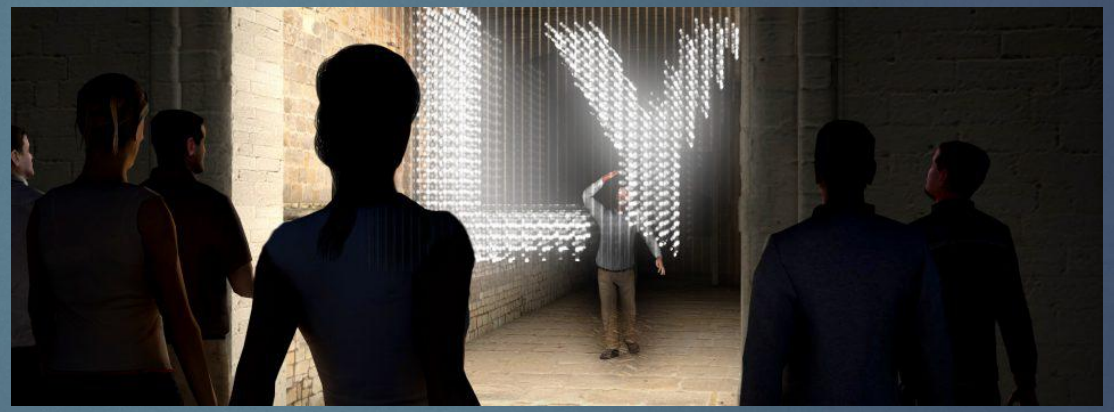
3. Carlo Ratti Associati

P3 Digital Water Pavilion

An interactive structures made of digitally–controlled water curtains.

P4 Passage Lumières

Flexible LED strips are suspended a metre above the ground, following the architecture and geometry of the passage.



3. Carlo Ratti Associati

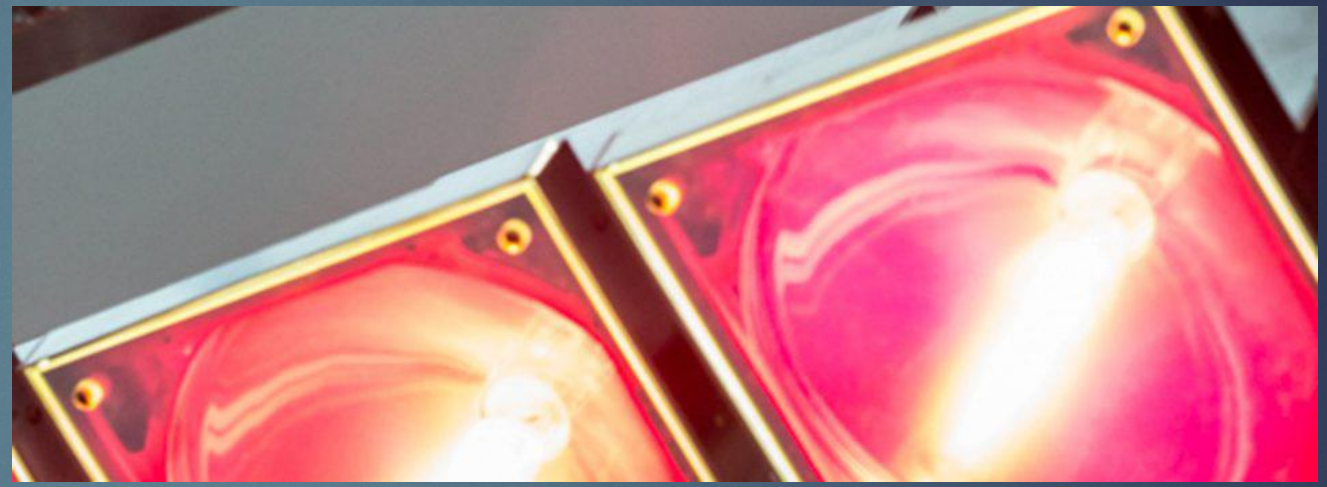
P5 Cool Paris

The Paris demonstrator showcases 3 different solutions to create 3 different climate modification options, namely: Greenhouse, Coolhouse and Treehouse.

3. Carlo Ratti Associati

P6 Local Warming

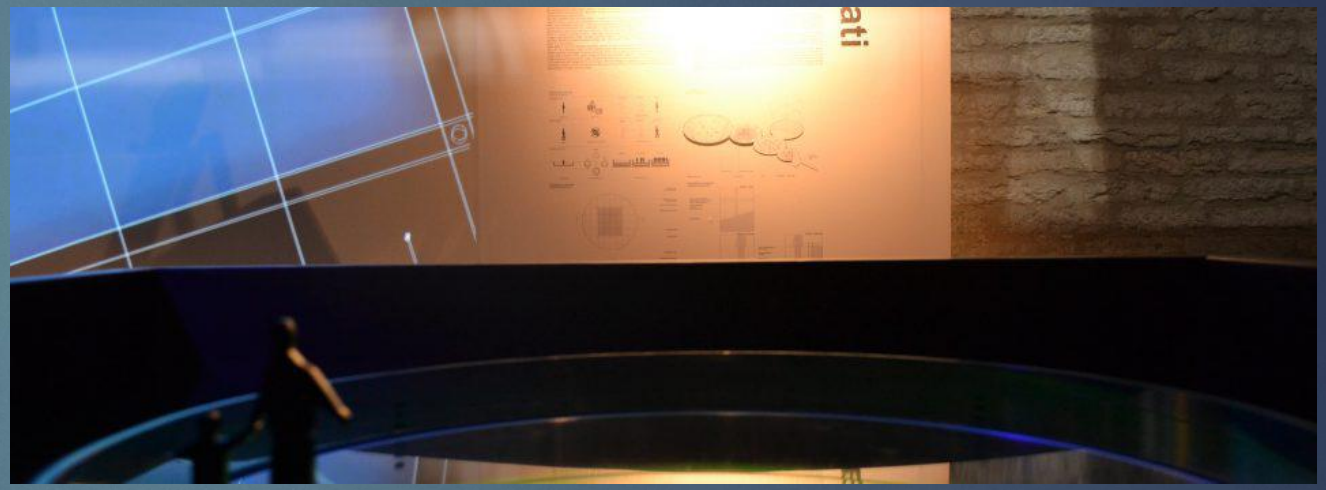
A rank of responsive infrared heating elements are guided by sophisticated motion tracking, creating a precise personal (and personalized) climate for each occupant.



3. Carlo Ratti Associati

P7 Responsive Flotation

It is a system creating an equilibrium between the user(s) and the level of the water.



3. Carlo Ratti Associati

P8 EARTH SCREENING

In the same way as self–driving cars are expected to revolutionize urban mobility, advanced robotic technologies are reshaping agriculture, with a new wave of innovations helping us to better respond to local terrain conditions.

3. Carlo Ratti Associati

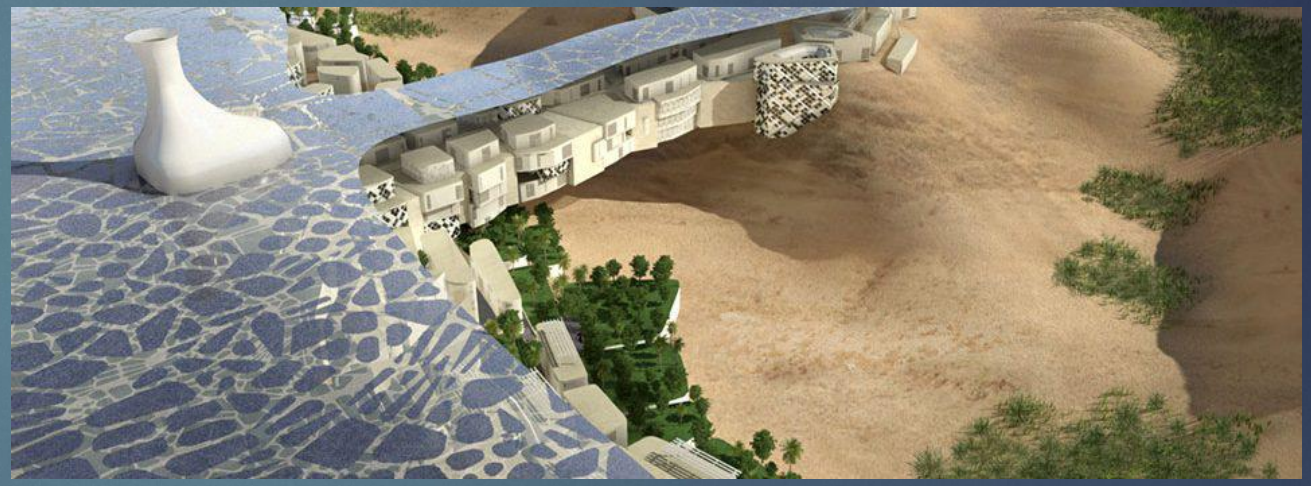
P9 Cloud

A new form of collective expression and experience, an updated symbol of our dawning age and a new form of observation deck, high above the Olympics.

3. Carlo Ratti Associati

P10 KA Care

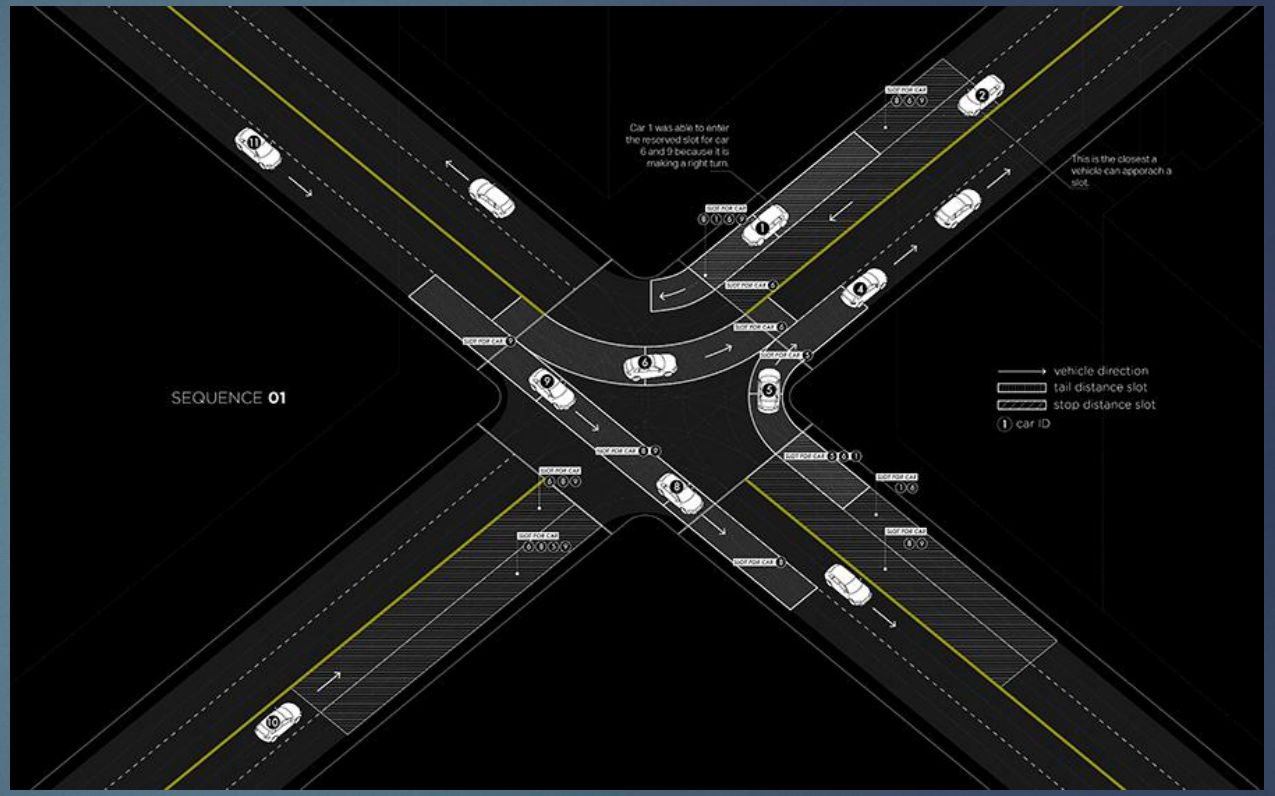
A translucent solar canopy floats ethereally above the inhabited areas, producing vital energy and improving thermal comfort beneath it, threaded with systems and services for nourishing and optimizing the city.



3. Carlo Ratti Associati

P11 The Slot–based System

A sequential diagram describes how the slot–based system reserves slots around the intersection to secure safety distance as cars travel through.



3. Carlo Ratti Associati

P12 Dynamic street

The Dynamic Street features a series of hexagonal modular pavers which can be picked up and replaced within hours or even minutes in order to swiftly change the function of the road without creating disruptions on the street.

106.Umbrellium

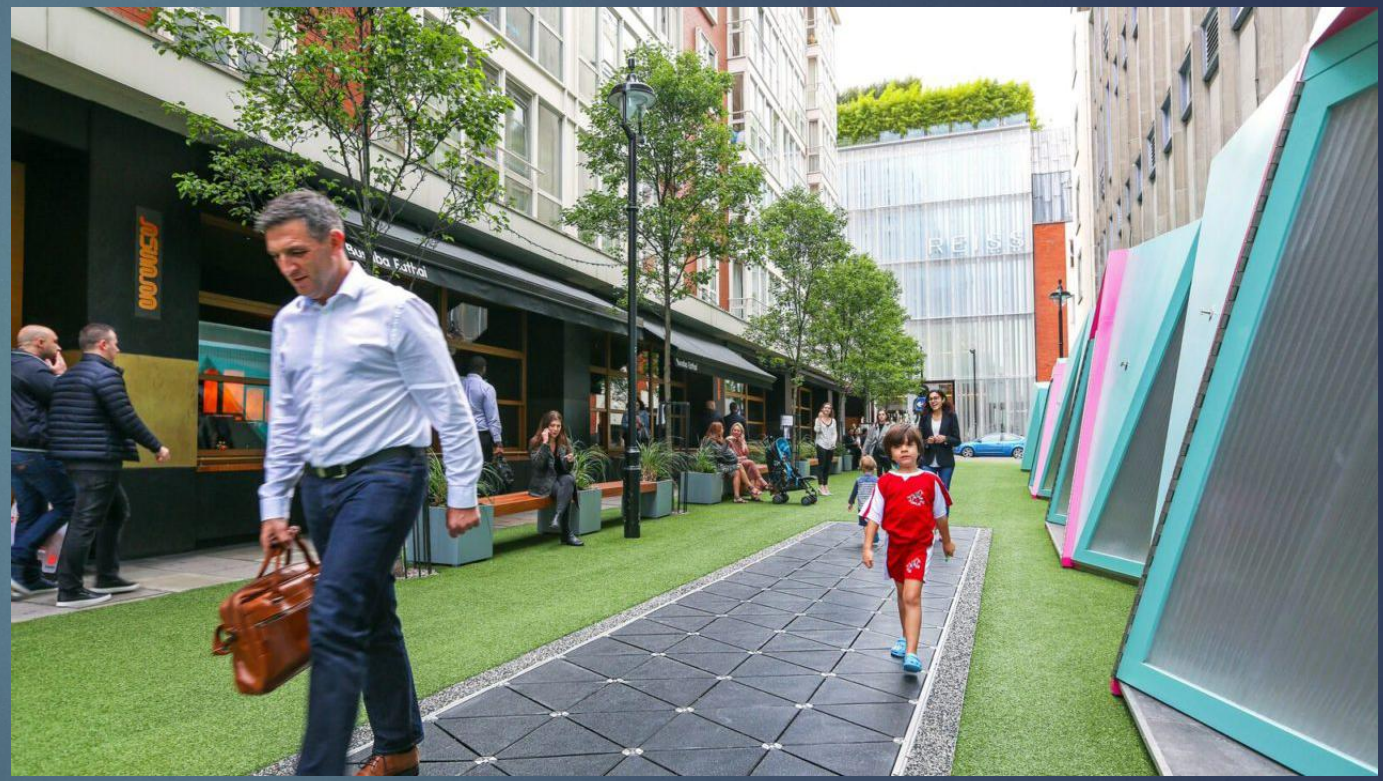
https://umbrellium.co.uk/

@umbrellium

3. Umbrellium

P1 Footstep energy

Pavegen is a start–up from London that has created a patented flooring technology which converts the kinetic energy from footsteps into off–grid power and data.



3. Umbrellium

P2 Lingue OS

- On–site server and software platform, control interface
- Built–in interoperability layer, can be configured to control a wide variety of systems using many different protocols (e.g. MQTT, DMX) and data formats
- Integrate with existing systems, custom interactive modes
- Community design engagement sessions
- Optional mobile app for public interaction

3. Umbrellium

P3 Starling–CV

Using a neural network framework, Starling CV tracks objects moving across road and pavement surfaces

Distinguishes between different types of pedestrians, cyclists and vehicles

Calculates precise locations, trajectories and velocities

Predicts near–future paths and speeds of moving objects

Evaluates probability of various safety and danger conditions

Optional: interactive road surface

Optional: Design framework for interactive road, pavement and crossing patterns

3. Umbrellium

P4 Pollution Explorers Toolkit (PET)

- A series of low-tech wearable tools designed to record a wearer's perception of AQ

3. Umbrellium

P5 The Burble

- Night–time event and spectacle for thousands of people
- Dramatic interactive Burble structure (usually for one night, or longer periods if necessary)
- Custom interactive app and/or twitter integration

3. Umbrellium

P6 Marling

Night–time event and spectacle for thousands of people

Audio system coupled with high spec laser machine designed for outdoor usage

Highly mediagenic experience that generates a lot of publicity for an event

3. Umbrellium

P7 Assemblance

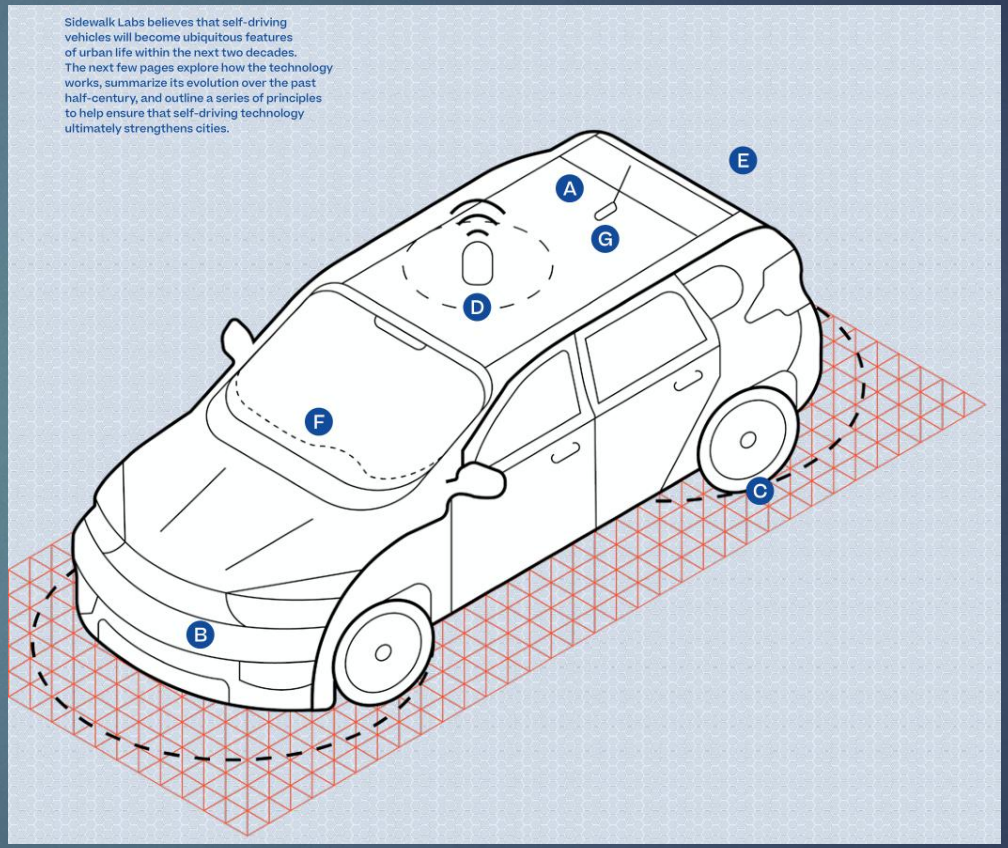
- Computer–controlled lasers, uses light as a physical material to construct forms in 3d space
- Sophisticated gesture tracking
- Structures are more stable and resilient when built together with other people
- Tourable, requires installation in large dark spaces

107.Google Sidewalks

https://www.sidewalktoronto.ca/

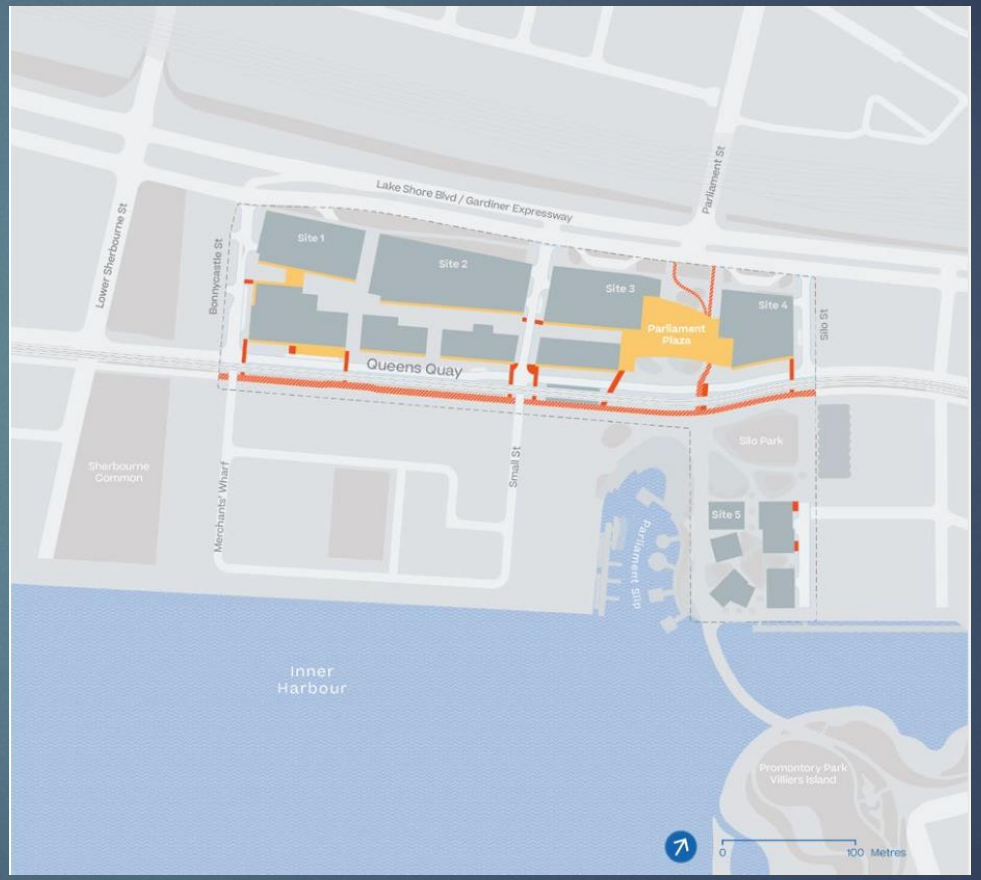
3. Google Sidewalks

P1 Automobile Vehicle



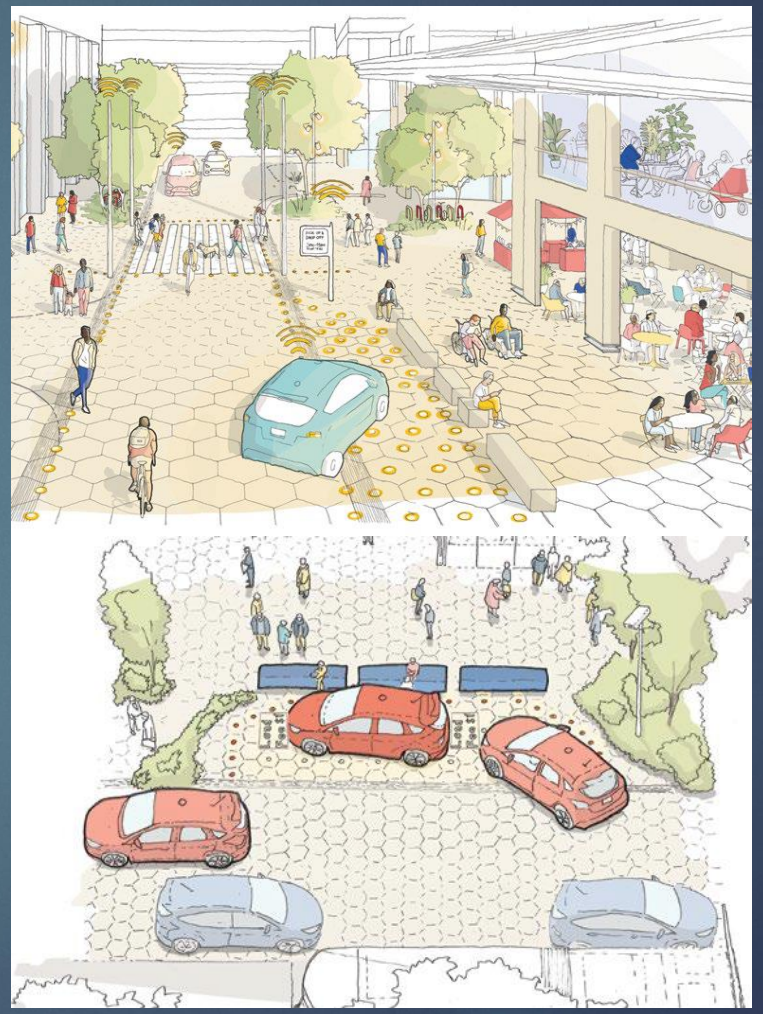
3. Google Sidewalks

P2 加热路面



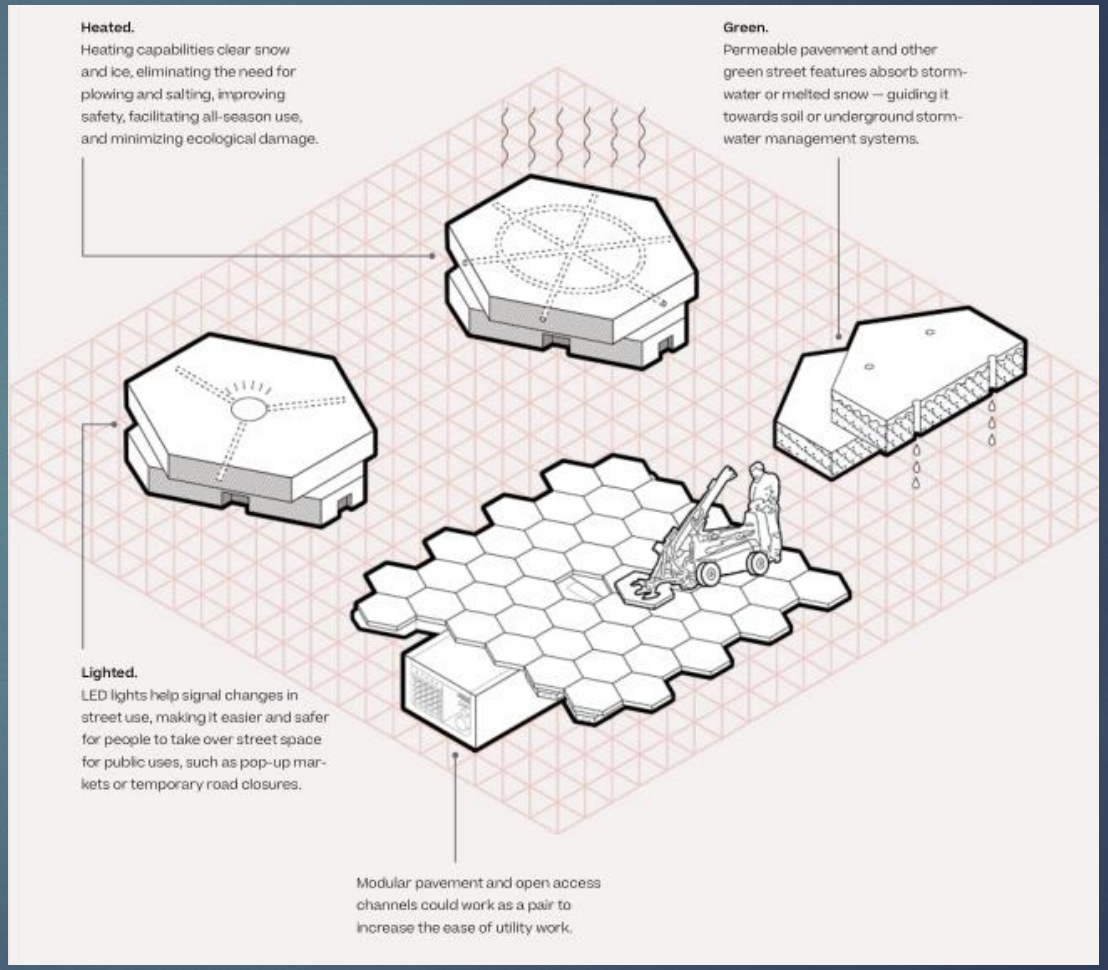
3. Google Sidewalks

P3 动态路缘石



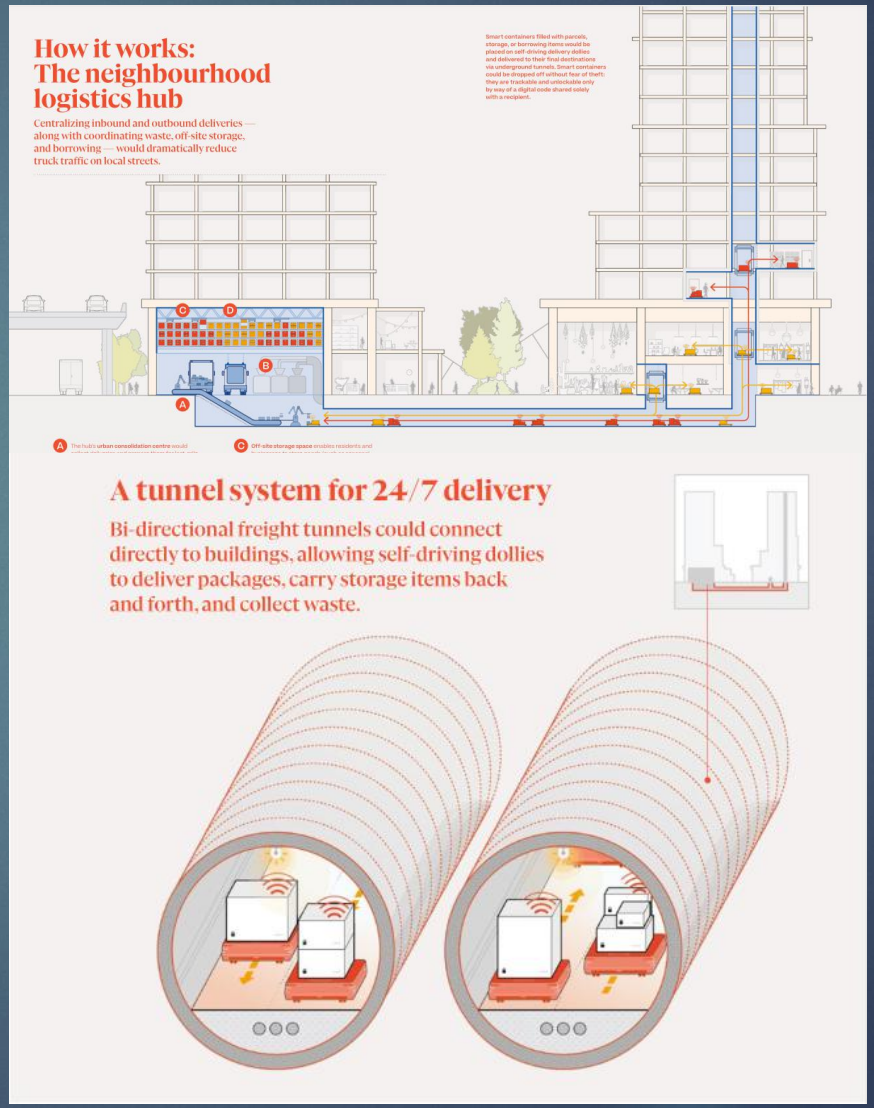
3. Google Sidewalks

P4 模块化路面



3. Google Sidewalks

P5 地下物流



3. Google Sidewalks

P6 绿波指示

3. Google Sidewalks

P7 自行车计数器

3. Google Sidewalks

P8 Weather Intervention

Making
Smart
Public
Space
by SIDI

108.DreamDeck

http://www.dreeck.com/

P1 智慧街道改造

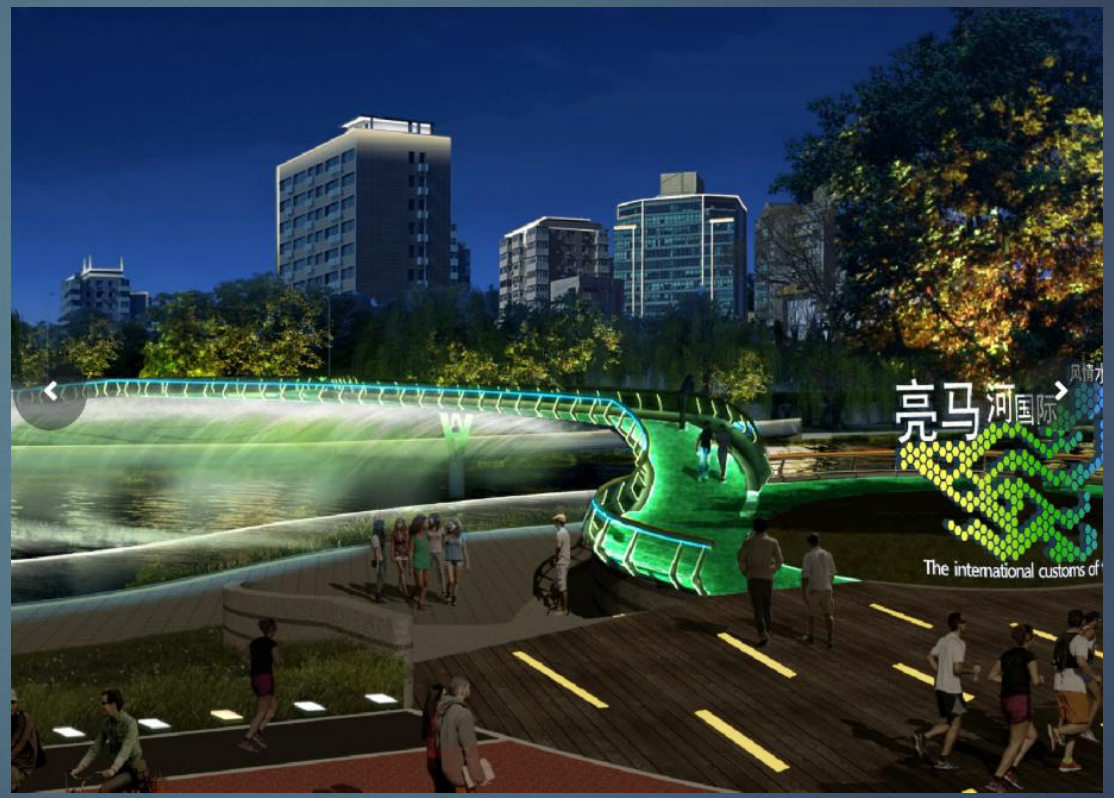
智慧交通设施

P2 海淀科技公园

景观管养自动化+灯光互动

P3 亮马河国际风情水岸

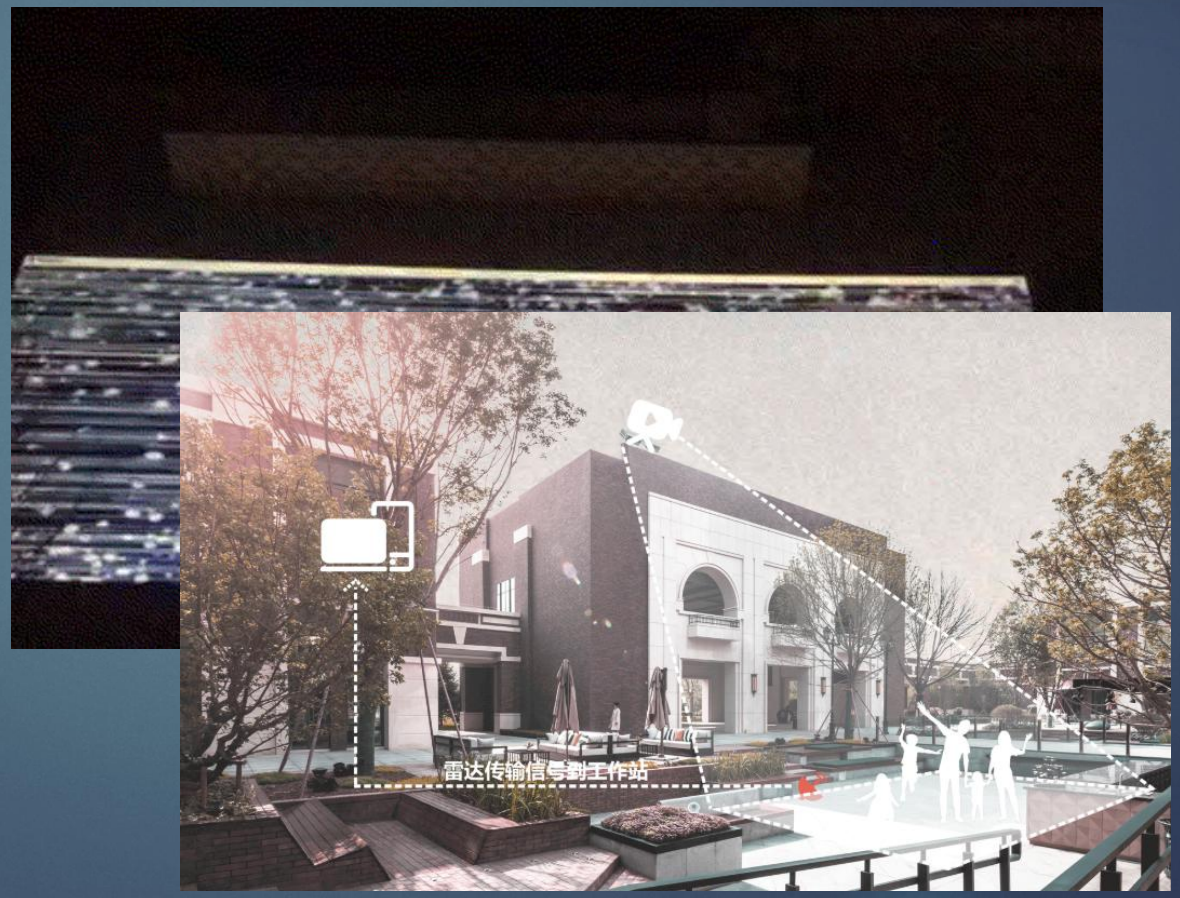
灯光水景互动



P4 万科翠柳书院

互动投影

互动水景



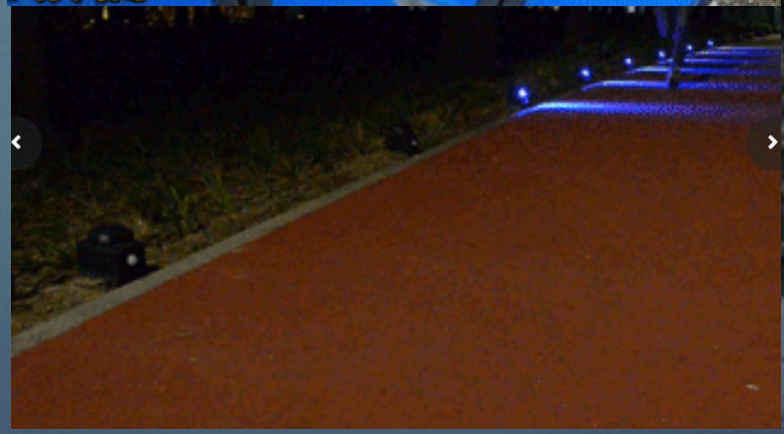
P5 智慧街道改造

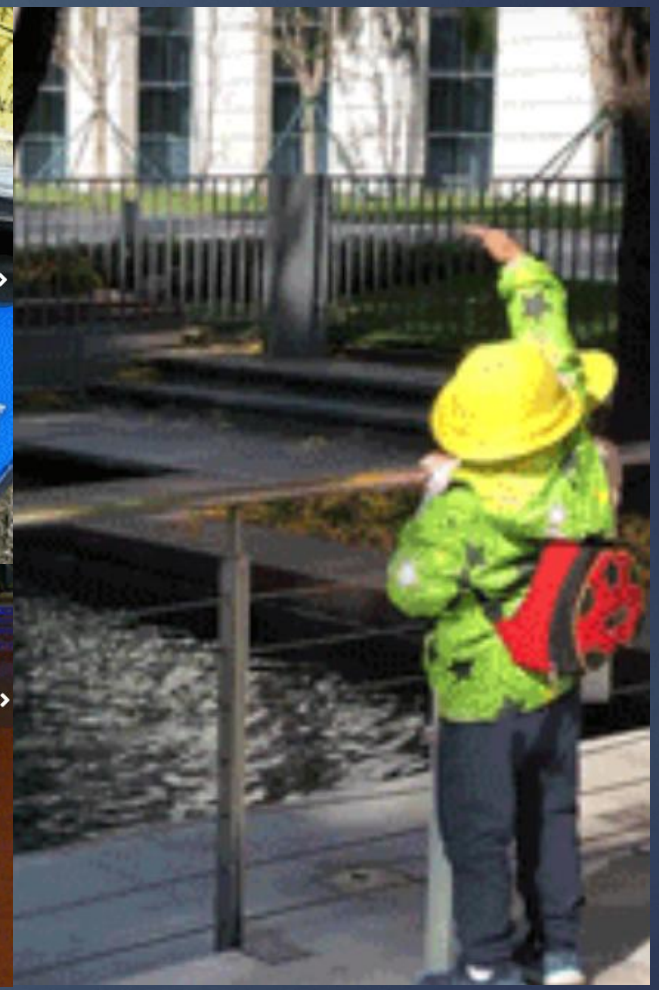
P6 海淀公园AI二期

智慧垃圾桶

水景互动

灯光互动





P7 世园会–海淀科技展园

重力喷泉互动

P8 金融街中央绿化带

智能跑道

P9 海淀小学智能座椅改造

智慧座椅

P1 Adaptable Bus Stop

P2 Flyfire

109. MIT Senseable City Lab

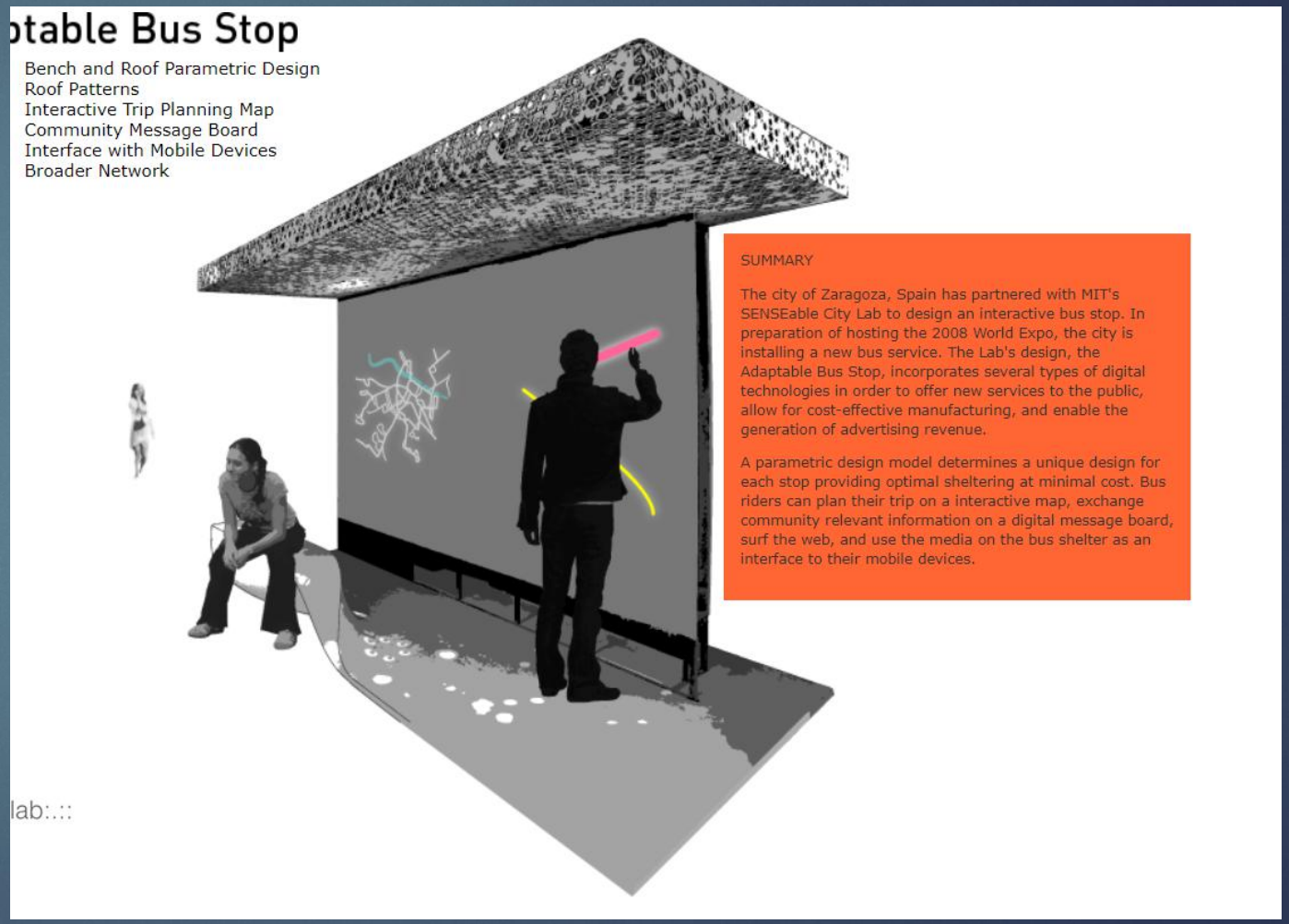
http://senseable.mit.edu/

@SenseableCity

3. MIT Senseable City Lab

P1 Adaptable Bus Stop

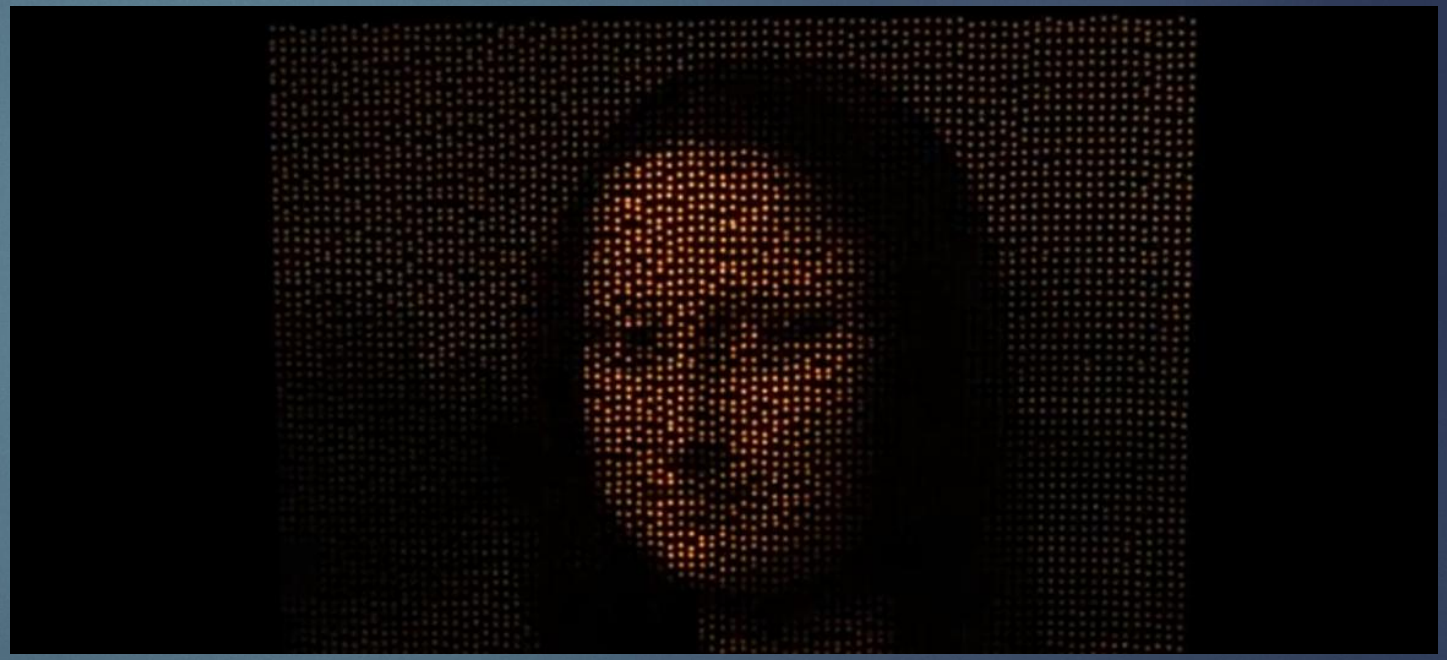
Incorporates several types of digital technologies in order to offer new services to the public, allow for cost–effective manufacturing, and enable the generation of advertising revenue.



3. MIT Senseable City Lab

P2 Flyfire

Transform any ordinary space into a highly immersive and interactive display environment.



FRA

110. IFSTARR

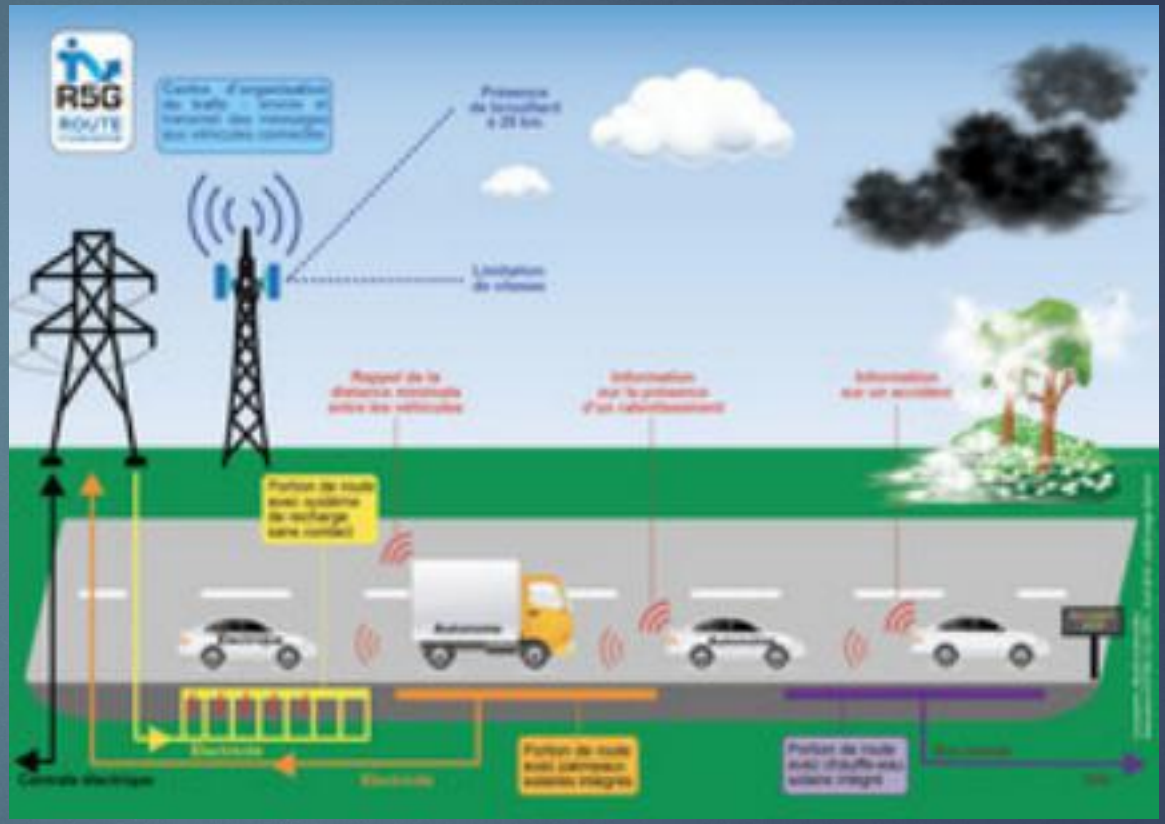
https://www.ifsttar.fr/en/welcome/

P1 SMALL CAMPUS
5th generation roads

To recharge its battery, there will be no need to stop, to connect and wait for the end of loading. The car can be recharged by rolling with contactless charging systems * on the road surface.

These roads can even produce electricity by capturing the energy of the Sun. Thanks to their black color, they can also absorb heat and use it to heat water. This hot water can then be used in a nearby town.

Connected vehicles will automatically send traffic organization centers information about weather conditions, the number of vehicles around them, and any accidents they encounter. In exchange, the centers will return to the vehicles that circulate in these places messages of speed limitation to avoid traffic jams or adapted weather forecasts (snow, rain, fog).



P1 Ground–level traffic lights

AUS

111. Büro North

https://buronorth.com/

@BuroNorth

3. Büro North

P1 Ground–level traffic lights

Prompted by accidents involving players of Pokémon GO, Australian firm Büro North has devised a concept for in–ground traffic lights to prevent pedestrians using smartphones from walking out onto the road (+ movie).

The Melbourne–based design agency's Smart Tactile Paving system would light up in red and green to tell face–down smartphone users when they can cross the road safely.

Making Smart Public Space by SIDI

Thanks!