

CITIES BUILDING FUTURES

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The path from a Smart City to a City
Building Futures

THE NEW FRONTIER

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Cities are transforming. The societies are transforming. Since new challenges rise everyday, continuos transformation seems to become the norm.

We have been studying the technological deployment in our society and cities in particular since 2014. In this paper, we summarise the findings from our studies, proposing a new approach for city development.

Our approach aims to help cities to accommodate the fast pace of technological development and to the speed of the city transformation.

Cities cannot change every year, they are meant to persist for centuries. Then, there is an important difference between what is coming as the latest tech fashion and what is needed for a city transformation.

We propose a city development framework which adapts the fast speed in technological development to the needs of a city. Our approach does not measure the maturity of a given technology but focuses on its impact on the culture, societal values and the future of a city.

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"It is not just about changing the physical structure of a city. It is about changing the soul."

- Janette Sadik-Khan
at SCEWC 2019

10 YEARS OF SMART CITIES

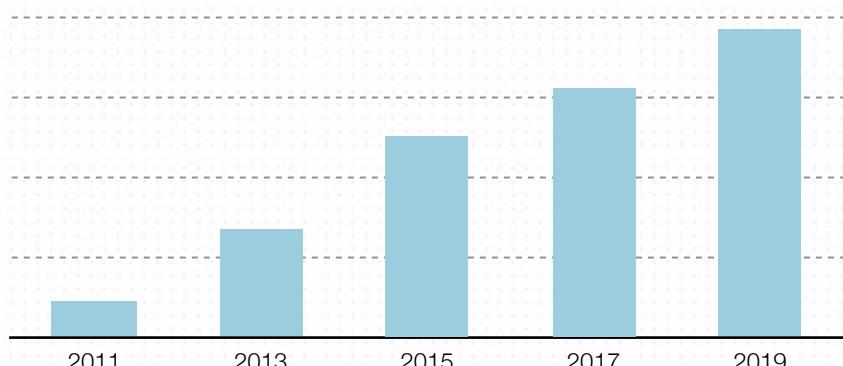
The best thing in not being a pioneer is that one can learn from the errors of the pioneers. Today, the digital transformation is a reality which has transformed ways of doing on all levels: individual, social and political. The people have been transformed with the adoption of mobile communications. Businesses have been transformed through virtualising their processes. The cities have been transformed with the deployment of intelligent devices at scale.

THE EVOLUTION IN UNDERSTANDING THE DIRECTION IN CITY TRANSFORMATION

We can follow the evolution in the understanding about how cities should transform for the new digital era by following the names of each edition of the Smart City Expo World Congress (SCEWC), which was inaugurated in 2011 in Barcelona.

Today, it is the world's leading event for cities being a unique meeting point for the whole smart city ecosystem. It started under the topic *Smart society for sustainable cities* and followed with *Smart Thinking Solutions, A better place to live, Change the world, Join the urban innovation, Cities for Citizens, Empower Cities, Empower People, Cities to Live In and Cities Made of Dreams*.

"Smart City Expo World Congress provides a unique meeting point for the whole smart city ecosystem. It started with 100 cities in 2011 and grew to more than 700 in 2019."



It is obvious how the global community of city planners changed their vision from adoption of technology to a citizen-centric approach. From just improving the cities infrastructure the understanding about smart cities evolved to changing the soul of a city as it was expressed by Janette Sadik-Khan in her keynote at SCEWC 2019.

KEY LEARNINGS FOR SUCCESS

CREA IDEA LAB has been participating at the SCEWC since 2015. We are also a member of the [European Innovation Partnership on Smart Cities and Communities](#). We share the learnings from our collaboration with the global community of smart cities developers as the following:

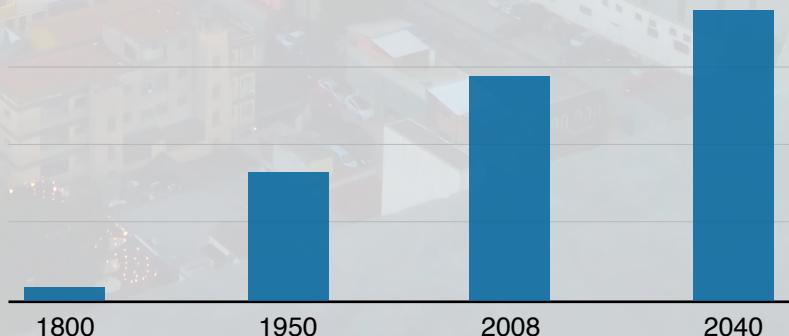
- **Smart City Brand.** The smart cities projects which succeed to scale up their innovation pilots have a city brand.
- **Citizen interaction is more important than just process optimisation.** It was proven that the success is related more to user/citizen engagement than process optimisations.
- **Integration.** It was shown that technological integration and unified standards are the fundaments for success.



"The 19th century was a century of empires, 20th century was a century of nation states and the 21st century will be the century of cities."

- Former Denver Mayor W. Webb

% of the global population living in cities



ONE MULTILAYER REALITY

Cities are not just streets and buildings but complex systems with interconnections at many levels. It can be defined that cities embodied

one multilayer reality where personal and collective interests and expressions are interrelated through social, economical and physical structures.

Cities can be understood as living organisms where complexity increases with the growth in their population.

TRENDS

Globally, there are 1.3 million people moving to cities each week. This dramatic shift is encouraging citizens, city planners, businesses and governments to start looking at visions of 'smart' cities.

MEGACITIES

Up until 1975 there were just 3 Megacities with over 10M people (New York, Tokyo and Mexico City). They became 21 in 2010. It is expected that their number will reach 29 by 2025.

ECONOMIC INFLUENCE

Cities are the engines of the modern economy. Urbanization continues to shape the trajectory of global growth in unprecedented ways. The top 600 cities generated 60% of global GDP in 2010. Tokyo is the #1 city today, with an estimated \$1.6 trillion GDP in 2019. This GDP value of Tokyo represents 1.07 percent of the world economy.

Additionally, it is projected that 80% of the global economic growth will occur in cities by 2030.

ENVIRONMENTAL & SOCIAL IMPACT

There is a strong link between the quality of life in cities and how cities draw on and manage the natural resources available to them. To date, the

trend towards urbanization has been accompanied by increased pressure on the environment and accelerated demand for basic services, infrastructure, jobs, land, and affordable housing, particularly for the nearly 1 billion urban poor who live in informal settlements. The world's cities occupy just 3 per cent of the Earth's land, but account for 60-80 per cent of energy consumption and 75 per cent of carbon emissions.

Because of the strong migration to cities, there is a specific goal, SDG 11, in the UN Agenda 2030.

SMART CITIES

Building urban resilience is crucial to avoid human, social and economic losses. Achieving climate neutrality in cities will require the development and deployment of a vast array of technologies and solutions in all sectors such as operational technologies, civic technologies, the Internet of Things (IoT), and the 3rd Platform (cloud, social, mobile, and big data/

analytics).

Smart and digital technologies and the use of data have the potential to facilitate efficiency in use of resources and better understanding of the workings of a city at a level of unprecedented detail.

This will only be achieved through world-class digital infrastructure and the deployment of the Internet of Things (IoT) and related applications at scale. It will also require open and interoperable datasets, linked and shared across the city ecosystem, that can break down silos and generate actionable insights through big data analytics and the use of Artificial Intelligence (AI).

CITIZEN ENGAGEMENT

Citizens bring original perspectives to R&I and policymaking, and their engagement helps bridge the gap between science, markets and society. Moreover, citizen engagement enhances the legitimacy of public policymaking improving its quality and societal relevance.



DEFINING THE EXPONENTIAL CITY

In 2014, *Exponential Organizations* was written as a guide to navigating the shifting business environment due to the introduction and proliferation of exponential technologies with Salim Ismail as a lead author. Since then, the ExO methodology was spread in the business world by the OpenExO community aiming to unlock abundance for a better future.

EXO METHODOLOGY

The ExO methodology bases designs in a framework of two sets of concepts: a MTP (Massive Transformative Purpose) and ExO attributes. The focus is placed on building projects with impact through structures that engage and exploit exponential technologies as digital platforms, Artificial Intelligence, 3D printing, renewable energy generation, etc.

The OpenExO community has demonstrated an accelerated innovation and digital transformation process through the ExO methodology. A great example for citizen

participation and collective innovation is the initiative Purpose Challenge by Purpose Alliance. There are 1500+ innovators engaged globally who created 140+ exponential solutions in less than six months.

CAN WE BUILD AN EXO CITY?

Can we apply the ExO methodology to city planning?

We currently are living in an exponential reality. Cities need to fit to it and prepare for making the best of the exponential opportunities while managing better their intrinsic risk and uncertainty.

In CREA IDEA LAB, we adapt the ExO MTP concept under the concept of Smart City Brand. Also, we use the ExO attributes as a starting point for the definition of the infrastructure's framework and its technological mix.

We use the ExO canvas to visualise the interrelationships and the information flows between the technological and social city structures.

Lastly, we apply the ExO methodology as a city innovation infrastructure on top of which the local economy can be transformed.

CITIES BUILDING FUTURES

Simple way to tackle complex realities

The public debate in the smart cities field, as we discussed above, has evolved from “*we need technology to solve the operational problems of a city*” to “*defining the city soul*”. Municipal governments have already started to gear cities towards being smarter, looking to implement solutions that add value and modify the city for the collective good.

While technology plays a role, there's a combination of things that go into making a smart city. A smart city is a hive of activity that is data-driven and is designed to streamline and automate processes, as well as help to make real-time decisions. The digitalisation converts passive systems into interactive bringing new opportunities and accelerating a cultural and social transformation.

But, the city is not becoming smart just because of technology. It needs social infrastructures which facilitate citizen engagement and participation. Involving the citizens is fundamental to bring life to the city and to grow its unique local economy.

By adopting the technology and embracing the new digital culture, the city reality is transformed and the needs evolve. Then, the need for a new approach for city development is raised.

In CREA IDEA LAB, we developed this new approach under the concept ***Cities Building Futures***. We define, under this term, a city which integrates all its dimensions in a smooth way making the life of its citizens enjoyable and easy.

We have seen it before in our personal lives with the adoption of the mobile phone. A highly complex system where variety of highly complex technologies combine to give an easy and enjoyable experience.

Today, we can do it on a city level. Then, the city transforms to a playground where everyone can express their self in a unique way by pursuing their dreams. The role of the city changes from solving the co-living issues of its citizens to a tool for developing a common future through the accomplishment of every resident's dream.

The *Cities Building Futures* approach is suitable to any type of city: existing and in project ones.

The main characteristics of the *Cities Building Futures* are the following:

- **UNIQUE SMART CITY BRAND**
- **INTEGRATED INFRASTRUCTURES**
- **UNIFIED STAKEHOLDER'S LEGAL FRAMEWORK**
- **CITY BRANDED LOCAL ECONOMY**



CIRCULAR SMART CITY

UNIQUE SMART CITY BRAND

Not just Smart but Unique City

Our study shows that the smart cities projects which succeed to scale up their innovation pilots have a city brand. All of them have defined their identity as more than a smart city. Barcelona is a *Digital City*. Eindhoven is a *Brainport*. Amsterdam is a *Circular City*.

The identity of a city shapes its future. This identity is built on its history, people, traditions & heritage, economic opportunities and dreams for the future.

WHY IS IMPORTANT?

The Smart City Brand is crucial for the alignment of all stakeholders in a city from the babies to the Mayor. It provides an identity to the citizens and a unique brand

strategy for the businesses. Both, identity and alignment are basic conditions for the success of a long-term deployment as the duration of city development usually is from 10 to 50 years.

BENEFITS

The Smart City Brand brings pride to the citizens. It facilitates the communication of the city development projects and the citizen engagement. It establishes a unique macro framework for the city development with specific goals and metrics. This framework overcomes the political cycles and assures the continuity of the projects in case of political change.

HOW DO WE DEFINE IT?

In CREA IDEA LAB, we have developed a methodology to help municipality teams define their unique Smart City Brand. We use concepts and tools from previous methodologies as The River Of Time, ExO MTP approach, City Anatomy and White Mirror evaluation frameworks.

While valuing first the city legacy, we define a macro framework based on the city history, traditions, heritage, nature and people identity.

People identity is a concept developed by CREA IDEA LAB, that defines the characteristics of a city within which its citizens identify themselves and are proud to belong to their specific city.

INTEGRATED INFRASTRUCTURES

“Calling it Smart or not, what citizen want from their city is to be useful, enjoyable, infinite in experiences and opportunities.”

Integrated infrastructure is one that can provide multiple services on-demand

Historically, we have been developing our world by using the problem-solving method. One problem receives one solution. Then, another problem receives another solution without trying to evolve the first solution to address the second problem. In the end, we end up with a mountain of small solutions which are useless in solving multidimensional problems.

This reality at a city level means effective infrastructure for any citizen need is problematic. When, we start to digitalise all these one-service infrastructures we get a smart city with a higher amount of problems. These projects fail because of interoperability, ownership rights conflicts, inability to address real needs and an increase in the generation of noise and waste. Before you know it, citizens start to laugh at their city calling it a Stupid City.

COMMUNICATIONS ARE THE BACKBONE FOR A USEFUL CITY

Calling it Smart or not, what citizens want from their city is for it to be useful, enjoyable, infinite in experiences and opportunities.

Today, thanks to the communication networks and Internet Of Things (IOT), the city can be made interactive and responsive to peoples needs. But, it is not only this. The city expands itself in the virtual dimension of the Internet facilitating new culture and life-styles.

How many infrastructures do we need in a useful city?

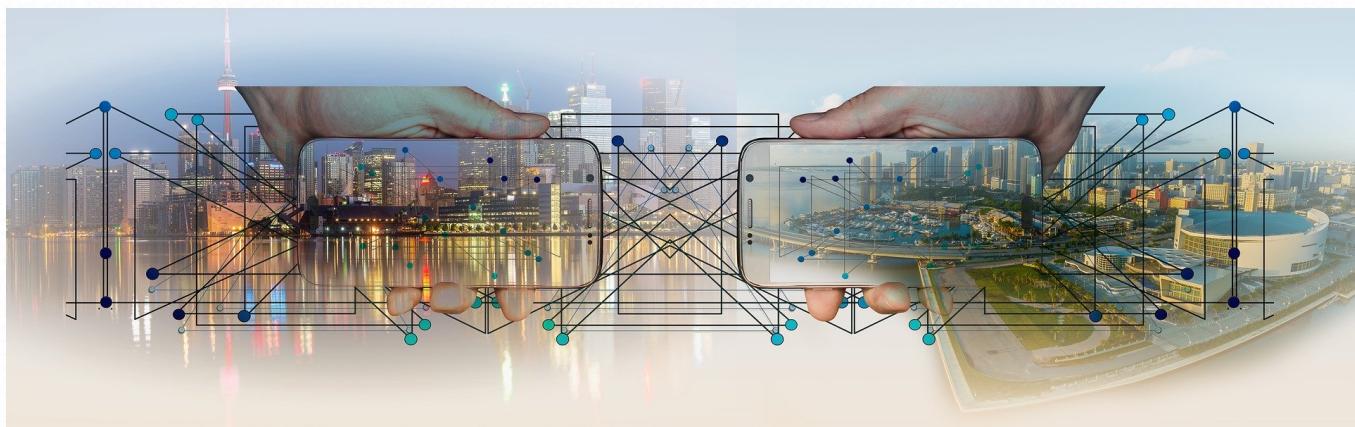
The answer is one: the communications infrastructure. We build on this basic infrastructure all of the needed services thanks to the technological advancement in energy, water & waste cycles, food production, healthcare, etc.

INTEGRATED SMART INFRASTRUCTURE

The integrated smart infrastructure results from our approach **Cities Building Futures** because it is the vehicle for building new realities. Its elements assure the accomplishment of the Smart City Brand through the involvement of the citizens as one of the infrastructure's basic elements.

Based on the examples of Barcelona and other European cities, we define the basic components of an integrated smart infrastructure as the following:

- › *Identity Integration*: An interactive infrastructure creates culture. The city identifies its purpose which the infrastructure will serve is its backbone. The integration of the city brand assures that the infrastructure is integrated homogeneously in the city landscape and won't stand alone as something artificial to city life.
- › *People Integration*. The infrastructure is interactive with the people. The citizens are present in all the process's steps from the design, through the deployment to the final expression. The infrastructure converts the citizen from a passive consumer into an active prosumer.
- › *Data Integration*. To be an interactive infrastructure, it consumes, creates and acts with/on data. The design of the flow of data within the infrastructure is called the Data Model. The Data Model is a key element for the successful deployment and exploitation of the smart infrastructure.
- › *Technological Integration*. One infrastructure provides multiple services. It is a key element for the acceleration of the deployment to scale, for the minimization of costs and maintenance needs.
- › *Unified Legal Framework*. An integrated smart infrastructure needs a unified legal framework for its purpose as a provider of multiple public services. It assures smooth hybrid operations between multiple stakeholders.



The Integrated Smart Infrastructure is the evolution of the concept of smart infrastructure in the new framework of *Cities Building Futures*. Its deployment has a specific purpose to be a tool for the citizens in building their personal futures.

HOW CAN IT BE DEPLOYED?

Citizen engagement, marketing and commercial promotion of the city are key elements in our methodology. We use the city identity as a macro frame to define the mix of technologies, the initial set of public services and business models that will contribute to a stable return of the investment, and lastly, for the creation of strategies to attract interest to the city from abroad (e.g. talent, businesses, investment, visitors).

Our deployment method applies the citizen engagement as a motor for the technological adoption and implementation of the Integrated Smart Infrastructures. Some of the technologies are purchased, some are co-created with the citizens.

The exact implementation road is customized to serve the city identity and to accommodate it to the speed of technological development of different solutions. The key criteria is to prepare the city for the adoption of technologies which will come in the next 20 to 50 years.

BENEFITS

The benefits of the Integrated Smart Infrastructure have been studied by us for variety of cases: small municipalities, big cities, regions and countries. These benefits can be summarized in the following key conclusions:

- › In all cases a reduction of an estimate 60-80% in the deployment time has been identified. An acceleration of the local economy transformation in the first two years of the projects can be observed.

- › The return on the investment has an exponential impact since for the same volume of investment multiple business models can be developed.
- › The needed investment decreases by the number of the services that can be served by the integrated smart infrastructure.
- › The management of the infrastructure can be simplified due to its unified legal framework which further decreases its maintenance costs.
- › In 8 of 10 cases a full automatisation of the processes can be achieved.

OPPORTUNITIES

The *Cities Building Future* approach sets the base for the realisation of a new vision about the future. It can be about the next 10, 20, 100 years. It widely explores future scenarios about social dynamics, public services and city systems, business models and creation of novel economic activities.

The Integrated Smart Infrastructure provides the opportunity for the creation of a new economic reality through the specialisation of the city in specific industries.

The Integrated Smart Infrastructure is a real tool to solve any environmental, social and economic challenge. It can empower cities and regions through adoption and exploitation of technologies that give personalised answers for their sustainable growth. At a regional scale, it creates opportunities for regional stability and prosperity.

UNIFIED STAKEHOLDER'S LEGAL FRAMEWORK

Through multiple efforts to digitalise and interconnect European cities, it was shown that technological integration and unified standards are fundamental for success. In our methodology *Cities Building Futures*, a Unified Stakeholder's Legal Framework is a fundamental component if we want to build an Integrated Smart Infrastructure. It is needed to assure smooth hybrid operations between multiple stakeholders that convert the Integrated Smart Infrastructure to a provider of multiple services. For example, it assures that one sensor can be used for multiple applications because there is an established legal path that regulates the ownership over the sensor's data and its access.

One of the main benefits of the Unified Stakeholder's Legal Framework is the minimalization of the duplication of sensors and the data which they provide along with a consecutive positive environmental impact and increased savings of public space.

The Unified Stakeholder's Legal Framework combines *People* and *Data Integration* into the Integrated Smart Infrastructure. It describes the city ecosystem of stakeholders and their relationships creating a transparent map. This map is the base for self-autonomous regulation between parties: citizen-to-citizen, business-to-citizen, business-to-business, business-to-public administration, citizen-to-public administration, between public administration entities.

In the *Cities Building Futures* methodology, we advocate for a legal framework that can be digitalised and become fundamental for the City Data Platform.

We call a City Data Platform the Enterprise Integration Platform of a city. It is a specific software which enables the integration and smooth communication of a digital network to connected devices, nodes and users.

The City Data Platform implements a specific data model for the city about its data flows between its layers and different dimensions. It connects devices, people, businesses and public administration services and entities in one unique structure that operates as one system. If there is no City Data Platform but there are smart infrastructures, they stay separated and can't bring their true value to the citizens.

If the City Data Platform is implemented just for the sake of the operations of the smart infrastructures and without a legal framework which regulates the ownership and the access to them, it eliminates their value extraction. Then, only the basic applications are available. Any improvement and new up-scaled applications become difficult to integrate. This can rapidly become an obstacle for the smooth operation of the city endangering the smart city vision.

On the other hand, a well designed City Data Platform based on a unified stakeholder's legal framework converts the Smart City into a *City Building Futures*, a complex machine which operates semi-autonomously.



BENEFITS: SOCIAL IMPACT

A well designed City Data Platform provides the following benefits to a city:

- › People come together easily.
- › All the stakeholders share all the knowledge connected in communities. This improves citizen participation and consequently, the city's resilience against crisis.
- › The city expands its physical dimension in to the virtual one. This multiplies the opportunities for its stakeholders.
- › The city becomes more inclusive as digital gender and generational gaps can be bridged leveraging the economic conditions between social classes.
- › New employment & Local Economy Growth is enabled.
- › The city can expand its cultural heritage promoting modern and emerging art.

BENEFITS: ENVIRONMENTAL IMPACT

At CREA IDEA LAB, we are promoting a Sustainable City Data Platform based

on VPLedger Blockchain technology. It facilitates the minimalization of data storage by converting the traditional data warehouse to a Distributed Digital Ledger. Then, the data is stored at the user device/node and it is not replicated at the city platform. We estimate a reduction of the demand for data storage to reach **1% of a traditional city platform**. This creates an important reduction of the demand for electricity and refrigeration for the hardware systems which support the digital services provided by the smart infrastructures. This energy efficiency impact is further improved by the unified legal governance model which limits the duplication of sensors by optimising their use and re-use. This also creates **savings in public space, an important reduction in costs of maintenance, technical intervention and downtimes**. Lastly, CREA IDEA LAB designs provide a **high level of cybersecurity and traceability** rooted in the use of the DLT and optimized design of the Content Management System where content is created and consumed locally.

As the City Data Platform is the heart of a Smart City, making it sustainable by design assures that the city will embrace a Zero Waste culture and will achieve a neutral carbon impact.

CITY BRANDDED LOCAL ECONOMY

Cities Building Futures methodology consists of four conceptual steps: defining the Smart City Brand, designing the technology mix of smart infrastructures as one Integrated Smart Infrastructure, shaping the stakeholder's relationships through an Unified Stakeholder's Legal Framework, and finally, identifying the city local industries which will exploit the potential of the Integrated Smart Infrastructure.

Our methodology has a specific focus on building a portfolio of business models and strategies aiming to boost the city's local economic growth. This focus is a guiding line to assure correct identification of the city identity, its reflection in the choice of technologies and the right configuration of the interconnections between different city layers and realities.

SETTING THE FUNDAMENTS FOR A NOVEL ECONOMIC GROWTH

Smart urban economy is a novel concept developed by CREA IDEA LAB. We promote a novel economic development for the city based on the exploitation of its smart cities infrastructure from stakeholders at all levels.

Citizens, enterprises and public administration can create and get value through their interaction with the smart city.

Additionally, we exploit the Smart City Brand of the city to create an economic attraction to it. This is why, we call the new portfolio of smart city industries, a City Branded Local Economy.

For example, the Smart City Brand of the city of Eindhoven is to be a Brainport. They built their local economy on the production of entrepreneurs, startups and innovation. The main product of the smart city project of Eindhoven is talent.

This example is quite common around the world as in the new global economy of knowledge, talent is a recognised good. Today, cities compete to attract and incubate talent offering a wellbeing and a dynamic lifestyle based on digital services.

ECONOMIC MODELS

We advocate that the economic model of each municipality is unique. In the light of the latest theoretical economic models, we promote that the municipality should make a coherent choice about it related to its identity. The existing theoretical models should be used as research frameworks to explore the ideal mix of economies which best fits its Smart City Brand.



B I B L I O G R A P H Y

- <http://www.smartcityexpo.com/en/>
- <https://www.postscapes.com/anatomy-of-a-smart-city/>
- <https://www.weforum.org/agenda/2019/10/cities-in-2035/>
- <https://tradingeconomics.com/united-states/gdp>
- <https://www.unenvironment.org/es/node/2037>
- https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme/mission-area-climate-neutral-and-smart-cities_en
- <https://www.openexo.com/>
- <https://ajuntament.barcelona.cat/digital/en>
- <https://brainporteindhoven.com/int/>
- <https://www.amsterdam.nl/en/policy/policy-innovation/policy-circular-city/>
- <https://www.urenio.org/2015/11/19/four-foundatioity-challenges/>
- <https://medium.com/@anuraj.io/white-mirror-on-the-wall-what-does-the-future-hold-for-us-all-4a13fadf66e2>
- <https://vpledger.com/>

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