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Il futuro delle città europee: politiche e migliori tecnologie disponibili per il Nuovo Bauhaus Europeo

The future of european cities: policies and best available technologies for the New European Bauhaus

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Abstract

Nel discorso sullo stato dell'Unione Europea, Ursula von der Leyen, Presidente della Commissione Europea, ha delineato la sua visione del futuro europeo subito dopo la prima drammatica ondata di Covid-19, ponendo le questioni urbane al centro dell'agenda politica europea. Per aprire la strada a un profondo rinnovamento sociale, culturale ed economico, la Presidente von der Leyen ha lanciato il Nuovo Bauhaus Europeo, nell'ambito del piano Next Generation EU, con l'intenzione di creare uno spazio continentale di co-creazione per architetti, ingegneri e designer, insieme ad artisti e studenti. Questo profondo rinnovamento europeo, saldamente radicato nei principi della sostenibilità e che richiama l'approccio storico del Bauhaus dei primi del Novecento, ha l'obiettivo di accelerare la transizione ecologica, con il supporto delle migliori tecnologie disponibili e dell'intelligenza artificiale per costruire un futuro migliore.

With the 2020 State of the European Union Address, Ursula von der Leyen, President of the European Commission, sketched her vision for the European future just after the first dramatic wave of Covid-19, placing urban matters in the inner core of the European political agenda. To pave the way for a deep social, cultural, and economic renovation, President von der Leyen launched the New European Bauhaus, within the framework of the Next Generation EU plan, intending to create a continental-wide space of co-creation for architects, engineers, and designers, together with artists and students. Such profound European renewal, firmly rooted in sustainability principles and recalling the historical Bauhaus approach of the early twentieth century, is aimed to help the ecological transition move forward, with the support of the best available technologies, as well as Artificial Intelligence for building a better future.

Keywords

Nuovo Bauhaus europeo, Sfide urbane, Transizione ecologica, Ecologia urbana, Sociologia urbana, Intelligenza artificiale, Città digitali

New European Bauhaus, Urban challenges, Ecological transition, Urban Ecology, Urban sociology, Artificial Intelligence, Digital cities.

1. Introduction

The city is, rather, a state of mind, a body of customs and traditions, and of the organized attitudes and sentiments that inhere in these customs and are transmitted with this tradition.

Robert E. Park (1915)

The current European Commission, is in office since 1st December 2019 and will be lasting until the 2024 elections, under the presidency of President Ursula von der Leyen[1]. Von der Leyen on the political guidelines presented for her candidature to the Commission presidency in 2019 stated that:
Europe must lead the transition to a healthy planet and a new digital world. But it can only do so by bringing people together and upgrading our unique social market economy to fit today's new ambitions. [1]
The same ideas were strongly reaffirmed by Mrs. Von der Leyen affirming in her address 2019 to the European Parliament that the most pressing challenge as Europeans "…*is keeping our planet healthy*" [1]. In the same address she declared her intention to put forward a Green Deal for Europe[2][2] within her first 100 days in office, as well as the first ever European Climate Law[3] [3] which will set the 2050 target into law.

Among those very challenging actions, aimed to controvert the present industrial and economical European trend into a more environmentally compatible one, President von der Leyen in her State of the Union address 2020 [4] sketched her vision for the European future just after the first dramatic wave of Covid-19, placing urban matters in the inner core of the European political agenda.an apparently secondary initiative linking ecological transition with cultural and social aspects, with the suggestive title of New European Bauhaus[4].

2. The Historical Bauhaus (1919-1933)

The initiative is directly referring to the Bauhaus[5] movement, which flourished in Germany between 1919 and 1933. The historical Bauhaus architectural school was founded by Walter Gropius[6] combining the pre-existing Weimar Academy of Arts and the Weimar School of Arts and Crafts, into what he called the Bauhaus.
European architecture until 1914 was still strongly rooted in the historical citations of the late Beaux-art style. The first world war, however, represented a real turning point for the architectural environment, because of the strong influence by the industrial and

[1] Ursula Gertrud von der Leyen (Brussels 8 October 1958) is a German politician who has been serving as the president of the European Commission since 2019. She previously served in the German federal government between 2005 and 2019, holding successive positions in Angela Merkel's cabinet, most recently as Minister of Defence. Von der Leyen is a member of the centre-right Christian Democratic Union (CDU) and its EU counterpart, the European People's Party (EPP).

[2] European Commission, COM(2019) 640 final, Brussels 11.12.2019

[3] European Commission, *Regulation (EU) 2021/1119 and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), Brussels, 30 June 2021.*

[4] European Commission: *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - New European Bauhaus: beautiful, sustainable, together,* [COM(2021) 573 final] Brussels, 15.9.2021.

[5] Bauhaus, or better *Staatliches* Bauhaus, is referring to a cultural movement that flourished in Germany from 1919 to 1933 and connected with a school of architecture, design, and applied arts. Based in Weimar until 1925, then in Dessau through 1932, and later in Berlin. The founder of the Bauhaus movement was architect Walter Gropius, who combined the activities and research of the Weimar Academy of Arts and the Weimar School of Arts and Crafts. The meaning of the name is "house of building," reworking the German word *Hausbau*, literally "building of a house." Gropius's "house of building" based the movement upon the integration of teaching various arts and crafts he considered natural allies of the architecture. A fundamental asset of the Bauhaus was the education sector, and the idea was to train students in architecture also in technical expert craftsmanship, in order to reconcile those two creativity sectors (Britannica, The Editors of Encyclopaedia. "Bauhaus". Encyclopedia Britannica, 2021)

[6] Walter Adolph Georg Gropius (1883 – 1969) was a German-American architect and founder of the Bauhaus School. Together with Alvar Aalto, Ludwig Mies van der Rohe, Le Corbusier and Frank Lloyd Wright, is considered one of the masters of modernist architecture.

technological innovation progresses, unfortunately, connected with any large conflict.
Peter Behrens[7], proclaimed already in 1909, the dignity of industrial architecture but it was scholar Gropius as part of the younger generation in Germany, to break the ties with Wilhelmine architecture, and together with the majority of the younger generation, declared himself supportive of the requests of the post-war modernity, recognizing the use of the new materials, production methods and forms, as well as the new tasks and problems the technique age [5].Reaffirming the principle of interdisciplinary work in creativity, together with some of the most interesting modernist architects in Europe, Bauhaus included several leading artists of that time, such as Paul Klee[8], Wassily Kandinsky[9], and László Moholy-Nagy[10] in different moments, Bauhaus was inspired by the British Arts and Craft[11] movement, as well as by the *Wiener Secession*[12], both

[7] Peter Behrens (1868 – 1940) German architect, graphic and industrial designer, working mainly in the period between 1900s and 1930s. Founding member of the German *Werkbund* in 1907 and leader of the rationalist / classical German Reform Movement of the 1910s, he was also an qualified educator, heading the architecture school at Academy of Fine Arts Vienna from 1922 to 1936. Several leading names of European modernism worked with him at their beginnings including Ludwig Mies van der Rohe, Le Corbusier, and Walter Gropius.

[8] Paul Klee (1879-1940) was a Swiss-German painter born in Locarno (Canton Ticino, Switzerland). He is considered one of the most prominent artists of the first half of the 20th century and an inspiration to many other artists. Paul Klee's first great success came in 1917 during the First World War. He was an appreciated painter and teacher, and in September 1920, he was asked to teach at the Bauhaus in Weimar, founded by Walter Gropius in 1919. In 1931, he became a professor at the Düsseldorf Academy of Fine Arts, from which he was dismissed in 1933 by the National Socialists, who attacked him violently, in 1934 he self-exiled in Switzerland, where he died in 1940.

[9] Vasily Kandinsky (1866 - 1944) was a Russian painter who became a German and then a French citizen. Considered one of the most important painters of the 20th century, he is often credited with creating the first abstract work of art (a watercolour) of the modern era, although art historians suspect that Kandinsky backdated the painting, that resembling his Composition VII, from 1913. While a professor at the Bauhaus, he wrote a book on the elementary forms of graphic art, published in 1926, corresponding to an evolution in the meantime in his painting.

[10] László Moholy-Nagy (1895 - 1946) was a Hungarian painter, visual photographer, and photographic theorist, who became a naturalized American in 1946. László Moholy-Nagy is known for his participation in various avant-garde movements in the interwar period, including Dada, Constructivism, and De Stijl. He explored new photographic techniques by designing photograms. The founder and director of the Bauhaus school, Walter Gropius, asked the artist to become a teacher there in 1923. He left the school in 1928 and moved to the United Kingdom in 1934. There he continued his artistic experiments and worked in advertising. In 1937, he left for the United States to open the New Bauhaus school in Chicago where he died in 1946 few months before obtaining American citizenship.

[11] The Arts and Crafts movement in the field of decorative and fine arts, developed between about 1880 and 1920, firstly from the United Kingdom, spreading throughout the British Empire and later in North America and Europe. Born as a reaction movement to the mere recovery of the classical style of a certain academicism, it was synonymous with traditional craftsmanship and often retrieved medieval, romantic or folkloristic styles of decoration. The first use of the term arts and craft is attributed to T.J. Cobden-Sanderson, although the inspirational principles and style underpinning the movement were shaped by the ideas of historian Thomas Carlyle, as well as historian and art critic John Ruskin and designer William Morris, while in Scotland the leading figure was Charles Rennie Mackintosh.

[12] The Vienna Secession (*Sezessionsstil* or Wiener Secession) is an artistic movement flourishing in the Austro-Hungarian Empire, mainly in Vienna, between 1898 and 1910. The movement is conventionally associated with Art Nouveau and Jugendstil, as part of the vast artistic renewal taking place in the Western Countries (Europe, North America, and their Colonial Possessions) at the end of the 19th century. The Vienna Secession nevertheless, has its characteristics, manifestos, exhibitions, and artists, with Vienna as main centre, but also blooming in Prague, Budapest and other cities of the Austro-Hungarian Empire. The Movement was founded by artist Gustav Klimt, designer Koloman Moser, architects Josef Hoffmann and Joseph Maria Olbrich, Max Kurzweil, Wilhelm Bernatzik, with also architect Otto Wagner joining shortly after. Secessionist artists aimed for a profound renewal of decorative arts, with the aim to create a "total art" unifying architecture, painting, sculpture, and decorative arts in steadfast opposition to academic art, specifically the Academy of the Arts in Vienna, the Vienna *Künstlerhaus*, and official art salons, with their traditional historicism. The movement was committed to the exchange of ideas with artists

chronologically developing between the end of the 19th Century and 1910, respectively in the United Kingdom and the Austro-Hungarian Empire. In the brief age in-between WW1 and WW2, the Bauhaus movement represented not only the desire for an innovative solution for the modernization of architecture and design but also the attempt to transform Germany into a truly European country, refusing together with all the pompous form of art and architecture of the late German empire, all the ideological background carried by the second German Reich[13]. Unfortunately, the social innovation principles connected with the Bauhaus movement, as well as the low key essential-style of the buildings well exemplified by the school building in Dessau (Figure 1), was considered not in line with the social and political views of the rising National Socialist party.

Fig 1 - The Bauhaus building in Dessau. Designed by Walter Gropius, it was the longest-serving of the three Bauhaus locations (1925–1932).

In the 1930s, Ludwig Mies van der Rohe[14], last director of the Bauhaus, was forced to leave Germany and emigrate in United States after the abrupt shutdown of the architectural school. Mies van der Rohe moved to Chicago, pursuing the track of the durable link connecting the Bauhaus with the architectural Chicago School[15]. It was the very same connection that linked philosophical and sociological academics from Germany with the symmetrical academic community in North America[16] between 1910 and 1930s.
After fleeing National Socialist Party in Germany in 1934, Gropius landed first in the United Kingdom and later moved to the United States, accepting to join Harvard Faculty in 1937. In his academic activities in the USA Gropius continued to promote the Bauhaus principles, well exposed in a dedicated publication:

"Our guiding principle was that artistic design is neither an intellectual nor a material affair, but simply an integral part of the stuff of life. Further, that the revolution in aesthetics has given us fresh insight into the meaning of design, just as the mechanization of industry has provided new tools for its realization. Our ambition was to rouse the creative artist from his other-world-liness and reintegrate him into the workaday world of realities; and at the same time to broaden and humanize the rigid, almost exclusively material, mind of the business man." [6]

3. The New European Bauhaus vision

Bearing in mind the historical Bauhaus principles and their social importance, the New European Bauhaus (NEB) initiative, introduced by President von der Leyen, presents several stimulating analogies compared with the historical movement of the early twenty

outside the Country, opposing any form of artistic nationalism.

[13] From the point of view of political regimes, Germany has had three *Reichs*: The Holy Roman Empire of the German Nation (962 – 1806) was called *A posteriori* the "Old Reich" (*Altes Reich*), and then the "*First Reich*" (*Erstes Reich*); The German Empire of 1871-1918 also called the "Second *Reich*" (*Zweites Reich*), and the Nazi regime (1933 – 1945) called the "Third *Reich*" (*Drittes Reich*).

[14] Ludwig Mies van der Rohe born Maria Ludwig Michael Mies (1886 –1969) was a German-American architect, commonly referred to as Mies, his surname. He is considered one of the masters of modernist architecture, together with Alvar Aalto, Le Corbusier, Walter Gropius, and Frank Lloyd Wright.

[15] In sociology, the works of the Chicago school between 1920s and 1930s (sometimes also called "Ecological school") are considered to be the basis of the emerging urban sociology and research, related to the urban environment. The Chicago school, combining sociological theory and ethnography, together with the field work in the difficult context of the industrial city of Chicago, involved scholars from several US universities. The major researchers of the Chicago school during the period 1920 / 1930s included Nels Anderson, Ernest W. Burgess, Ruth Shonle Cavan, Edward Franklin Frazier, Everett Hughes, Roderick D. McKenzie, George Herbert Mead, Robert E. Park, Walter C. Reckless, Edwin Sutherland, W.I. Thomas, Frederic Thrasher, Louis Wirth and Florian Znaniecki. Social activist, social scientist and Nobel Peace Prize winner Jane Addams also maintained close ties with some members of the Chicago School of Sociology, together with some greatest architects and designers of their time, among them Frank Lloyd Wright.

[16] After a relatively short permanence in United States, Mies van der Rohe was appointed head of the architectural school in Chicago, that is presently part of the Illinois Institute of Technology.

century. The European situation in late 2019 was already quite critical, and the tasks in front of the newly appointed European Commission was quiet challenging from social, economic, political, and environmental points of view.

The conclusion of the withdrawal procedure of the United Kingdom (UK) from the European Union (EU) formalized at the end of January 2020 (the so-called BREXIT[17]), potentially jeopardizing the very reason for the existence of the European Union. Furthermore, between the end of 2019 and early 2020, the outbreak of the Covid-19 pandemics created a real perfect storm, paralyzing the entire world and forcing the European Commission and the Member States to take extreme measures in order to save the Union both internally and as an international player[18].

The prompt reaction of President von der Leyen facing such an ambushing situation was admirable in any sense.

In order to cope whit, the potential negative effects of Brexit towards the European Union, she conducted a very firm negotiation with the UK Government aimed at safeguarding the European citizens' rights and the economical assets of the Union[19].

Regarding the Pandemic outbreak, the proposal coming from the EU Commission was to create a massive recovery plan[20], that von der Leyen proposed to the Heads of State and Governments of the Union: a recovery package of 1.8 trillion euros reworking the EU budget for 2021-2 including the ambitious plan denominated Next Generation EU[21] [22][7]. However, what it seems the more stimulating initiative launched by the EU Commission in order to inspire a process of social, cultural, environmental, and urban renovation in Europe in the next years is the New European Bauhaus (NEB) [8].

The main focus of the initiative is the built environment considered the main scenario of the direct and indirect impacts coming from Global changes, envisioned broadly as demographic transformations, climate change, extreme weather events, health crises and energy challenges[23][9]. The built environment, not always regarded as a real environmental problem at the global level, is now believed to be responsible for at least 40 percent of anthropogenic greenhouse gas emissions [10], without mentioning all global ecological and socioeconomic impacts, directly or indirectly associated with urban areas. Although urban areas represent less than 2% of the earth's surface, their

[17] The withdrawal of the United Kingdom from the European Union, colloquially referred to as "Brexit" was a decision consequence of the British national referendum of 23 June 2016, in which 51.89% of the voters voted for the country's withdrawal from the founding treaties of the European Union and Euratom. The procedure takes place according to Article 50 of the Treaty on European Union (TEU), essentially started on 29 March 2017, when the British government formally announced to the European Council its intention to leave the Union. The actual exit was scheduled for 29 March 2019 but was postponed three times until 31 January 2020.

[18] The Severe Acute Respiratory Syndrome Coronavirus-2 (SARSCoV- 2) is the name given to the new coronavirus of 2019. COVID-19 is the name given to the disease associated with the virus. SARS-CoV-2 is a new strain of coronavirus that has not previously been identified in humans. The World Health Organization (WHO) established the official outbreak of the epidemic emergency in December 2019, when the WHO country office in China received the information about the outbreak of an atypical pneumonia of unknown etiology detected in the city of Wuhan in China's Hubei province. The first patients were apparently epidemiologically linked to a possible zoonosis, occurring probably in the Huanan Seafood Wholesale Market of the city of Wuhan. The World Health Organization in January 2020 classified the problem as a Public Health Emergency of International Interest and then on 11 March 2020, switched to classifying it as a pandemic, a classification confirmed on 12 March. Due to the rapid international circulation of people, especially in connection with air travel, in a very few weeks the virus reached high levels of diffusion in many countries of the world. By January 2021, more than 98.8 million cases had been confirmed worldwide, with more than 2.12 million deaths, directly or indirectly ascribable to the COVID-19 infection. (Cinquepalmi, F.: *Towards (R)evolving Cities: Urban fragilities and prospects in the 21st century*, Didapress, Firenze 2021 – pp. 166-169).

[19] The UK withdrawal agreement from the EU, covered the following main areas: **Money**, particularly the division of assets and liabilities, and payment of any debt outstanding; **Citizens' rights,** both of British citizens in EU countries and vice versa; **Border arrangements and customs**, particularly along the border between the UK and the Republic of Ireland. The law, and the mechanisms for resolving disputes, are currently vested with the European Court of Justice.

[20] European Commission, *COVID-19 EU Coronavirus response*, © European Union, Brussels, 2020.

[21] European Commission: *Regulation (EU) 2020/2094* Brussels, 14 December 2020.

[22] European Commission: COM (2020) 456 final, Brussels, 27.5.2020

[23] Cinquepalmi, F.: *Towards (R)evolving Cities.* 2021 p. 127

consumption is about 78% of the global energy realizing in atmosphere more than 60% of total emissions of carbon dioxide and other greenhouse gases[24].

Besides the adverse effects of global warming and climate change, Cities have thus become the focal point of many other problems ranging, and the consequent aggravation of: "*...physical and psychological health problems, inequality, and alienation, reduction of economic opportunities, social fragmentation, and conflicts"* [11]. However, Cities are in the meantime experimental sites for innovative solutions of contemporary global challenges [11], in line with United Nations Goal 11 of the 2030 Sustainable Development Goals (SDGs) [12]: *"Making Cities Inclusive, Safe, Resilient and Sustainable"*[25].

In order to improve effectiveness of the NEB programme, the EU Commission have rooted the programme within the Horizon Europe[26] Work Programme 2021-2022, setting key orientations for investments in the first 4 years of activities[27] [13]. The objectives of the New European Bauhaus (NEB) are in line with these orientations, and more specifically are:

- *Promoting an open strategic autonomy;*
- *Restoring Europe's ecosystems and biodiversity;*
- *Making Europe the first digitally enabled circular, climate-neutral and sustainable economy; and*
- *Creating a more resilient, inclusive and democratic European society.*[14]

Horizon Europe work programme 2021-2022 was developed before the presentation of NEB idea to EU Member States, however, the acknowledged importance of the initiative and its cultural approach prompted the Horizon 2021-2022 programme to be amended, in order to introduce the possibility of specific calls to be dedicated to the NEB, focusing on Pillar II of the programme dedicated to 'Global Challenges and European Industrial Competitiveness [14].

Historical *Staatliche* Bauhaus used to be aimed at reconciling architecture with art, artisanry, and industry, having in mind a deep social renovation approach, with the idea to improve the general quality of citizen's life, brought to the vast majority of the population. A very similar vision is currently being pursued by the New European Bauhaus. Deeply rooted in the application of the resilience and circular economy approaches to urban metabolism in order to help cities to survive the current global threats, as well as in social innovation, to be realized with appropriate incentive policies - both at the national and EU level - but also through the application of Best Available Technologies. This will imply the full deployment of a real Digital Agenda for Europe and the use of the most advanced forms of Artificial Intelligence.

4. A new Digital agenda for Europe

Reinforcing the European Digital agenda, building on the first 10 years of the plan (2010-2020), has been considered by the European Commission a necessary step in order to overcome the multifactor crisis previously described. The first Digital Agenda for Europe is dating 2010[28] [15] and was essentially based upon public consultations, in particular on inputs from the Digital Competitiveness Report 2009. Strongly related to EUROPE 2020, the strategy for a smart, sustainable and inclusive growth[29][16]. The objective of this first Agenda was to draw a path for maximising the social and economic potential of Information and Communication Technologies, mainly the Internet as a tool considered essential for economic, social, and interpersonal activities. The Agenda was designed to stimulate innovation, economic growth, and the improvement of the everyday life of citizens and businesses with a 10 years duration until December 2020. The updating process of the Digital Agenda for Europe coincided with the outbreak of the Covid-19 pandemic in February 2020.

The Communication entitled "Shaping Europe's digital future"[30][17], focused on the importance of Digital solutions such as communications systems, artificial intelligence, or quantum technologies as relevant tools

[24] *Ibidem* p. 130

[25] The Sustainable Development Goals are: 1) No Poverty; 2) Zero Hunger; 3) Good Health and Well-being; 4) Quality Education; 5) Gender Equality; 6) Clean Water and Sanitation; 7) Affordable and Clean Energy; 8) Decent Work and Economic Growth; 9) Industry, Innovation, and Infrastructure; 10) Reducing Inequality; 11) Sustainable Cities and Communities; 12) Responsible Consumption and Production; 13) Climate Action; 14) Life Below Water; 15) Life On Land; 16) Peace, Justice, and Strong Institutions; 17) Partnerships for the Goals.

[26] Horizon Europe is a 7-year scientific research programme, and is the main programme supporting common research activities within European Union with a total budget planned in 95.5 billion of Euros. It is the most advanced tool for European global competitivity, and is considered the largest research funding programme ever approved worldwide.

[27] European Commission, Dec. C(2022)2975 Bruxelles, p. 5

[28] European Commission, COM(2010)245 final, Brussels, 19.5.2010.

[29] Communication from the Commission, COM(2010) 2020 final, Brussels, 3.3.2010

[30] European Commission, COM(2020) 67 final, Brussels, 19.2.2020

to enrich our lives, underpinning in the meantime the potential risks arising from digital technologies, such as the lack of control over personal data and the increase of artificial solicitations on personal devices, as well as cyberactivity potentially threatening citizens personal well-being or upsetting critical infrastructures and governments security[31].

The idea behind the 2020 Communication could be exemplified by a puzzle, interlinking all different elements considered unavoidable for ensuring Europe's role as a front runner in the digital age, with the concept of "Trust" in the middle of the scheme, as in Figure 2.

The 2020 Communication is sketching a five-year plan until 2025, building on three key objectives in order to ensure digital solutions for guiding Europe towards the digital transformation, both for citizens benefit - fully respecting their values - and for giving to Europe a leading role at global scale, namely:

1) *technology that works for people*[32]*;*
2) *a fair and competitive economy*[33]*;*
3) *an open, democratic and sustainable society*[34]*.*

All three key objectives are declined on several key actions and among them the most relevant to the NEB are the ones listed under key objective 1, to be implemented according to a quiet tight schedule, as in Table 1. A further transversal objective is envisaged within the Communication COM(2020) 67 and dedicated to The international dimension – Europe as a global player, based on five more key actions, aimed to reinforce the European role in the international market, not only promoting the regulatory approach of EU at global scale, but also advancing the European approach both in the global digital market as well as progressing in the global digital agenda within relevant international bodies such the United Nations, the OECD , ISO and the G20 , with the support of EU Member States . Key actions to be implemented within the 5 years' time of the Communication agenda could be summarized as in Table 2.

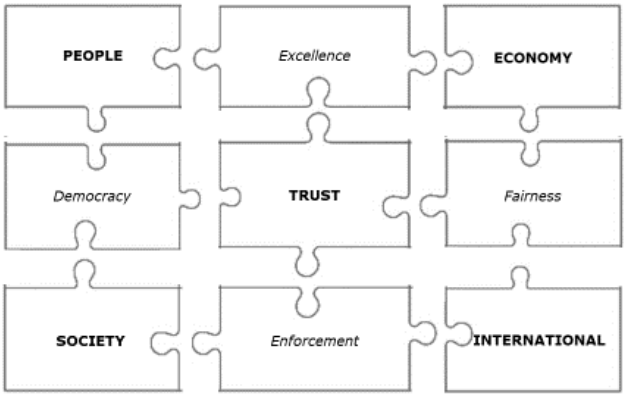

Fig 2 - The so-called "Puzzle", exemplifying all factors involved in the European Digital Strategy 2020-2025, all factors are interconnected and in the centre is (®European Commission 2020)35.

A further transversal objective is envisaged within the Communication COM(2020)67, dedicated to *The international dimension – Europe as a global player*, based on five more key actions, aimed to reinforce the European role in the international market. Communications COM(2020)67 is not only promoting the regulatory approach of EU at global scale, but also advancing the European approach both in the global digital market as well as progressing it in the global digital agenda within relevant international bodies such the United Nations, the OECD[36], ISO[37] and the G20[38],

[31] *Ibidem*, p. 1

[32] *"Development, deployment and uptake of technology that makes a real difference to people's daily lives. A strong and competitive economy that masters and shapes technology in a way that respects European values". Ibidem*, p. 2

[33] "*A frictionless single market, where companies of all sizes and in any sector can compete on equal terms, and can develop, market and use digital technologies, products and services at a scale that boosts their productivity and global competitiveness, and consumers can be confident that their rights are respected*." *Ibidem*, p. 2

[34] *"A trustworthy environment in which citizens are empowered in how they act and interact, and of the data they provide both online and offline. A European way to digital transformation which enhances our democratic values, respects our fundamental rights, and contributes to a sustainable, climate-neutral and resource-efficient economy". Ibidem*, p. 2

[35] *Ibidem*, p. 3

[36] The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental organization based in Paris with 38-member countries, that since 1961 is aimed to promote economic progress and world trade committing to democracy and, providing a platform for comparison of national policies, approaching common problems, identifying good practices.

[37] The International Organization for Standardization (ISO) is an international standard development organization based in Geneva and composed of representatives from the national standards organizations of member countries. Since 1947, the organization develops and publishes standardization in all technical and nontechnical fields other than electrical and electronic engineering.

[38] The Group of Twenty (G20) is an intergovernmental forum of 19 among the major economies of the world and the European Union (EU), created in 1999

with the support of EU Member States[39]. Key actions to be implemented within the 5 years' time of the Communication agenda could be summarized as in Table 2.

Tab. 1 – Key action proposed as outcomes of key objective "technology that works for people"[40]

Key actions	Description
White Paper on Artificial Intelligence	Setting out options for a legislative framework for trustworthy AI (adopted together with this Communication), with a follow-up on safety, liability, fundamental rights and data (Q4 2020).
Building and deploying cutting-edge joint digital capacities	In the areas of AI, cyber, super- and quantum computing, quantum communication and blockchain. European Strategies on Quantum and blockchain (Q2 2020) as well as a revised EuroHPC Regulation11 on supercomputing.
Accelerating investments in Europe's Gigabit connectivity	Through a revision of the Broadband Cost Reduction Directive12, an updated Action Plan on 5G and 6G, a new Radio Spectrum Policy Programme (2021). 5G corridors for connected and automated mobility, including railway corridors, will be rolled out (2021-2030) (2021-2023).
A European cybersecurity strategy	Including the establishment of a joint Cybersecurity Unit, a Review of the Security of Network and Information Systems (NIS) Directive13 and giving a push to the single market for cybersecurity.
A Digital Education Action Plan	To boost digital literacy and competences at all levels of education (Q2 2020).
A reinforced Skills Agenda	To strengthen digital skills throughout society and a reinforced Youth Guarantee to put a strong focus on digital skills in early career transitions (Q2 2020).
Initiative to improve labour conditions of platform workers (2021).	The growing number of online platforms has created new opportunities for people to earn income, enter or remain in the labour market, raising new questions on legal protections for people who do not have a worker status yet who share some of the vulnerabilities of workers. The Commission will therefore propose an enhanced framework for platform workers.
A reinforced EU governments interoperability strategy	To ensure coordination and common standards for secure and borderless public sector data flows and services. (2021)

Tab. 2 – Key actions proposed as possible outcomes of the key objective entitled "The international dimension – Europe as a global player"[41][18]

Key actions	Description
A Global Digital Cooperation Strategy (2021)	Promoting a European approach to the digital transformation that would builds upon the successful history of European technology, innovation and imagination, vested in European values, including openness.
A White Paper	Shaping an instrument on foreign subsidies (Q2 2020).
A Digital for Development Hub	To build and consolidate a whole-of-EU approach promoting EU values and mobilising EU member states and EU industry, Civil Society Organisations (CSOs), financial institutions, expertise and technologies in digitisation.
A strategy for standardisation	Allowing the deployment of interoperable technologies in full compliance with Europe's rules and standards, promoting worldwide an European approach (Q3 2020).
Mapping of opportunities and action plan	In order to promote the European approach in bilateral relations and multilateral fora (Q2 2020).

5. Enabling technologies for a better future

The exponential growth of the urban population throughout Europe represents a global trend that does not seem to be slowing down in the near future. According to the United Nations demographic statistics service, since 2010 urban population (3.42 billion) surpassed globally rural areas inhabitants (3.41 billion), and demographic projections to 2050 draw for the human species an almost exclusively urban future with 68% of the population living in urban areas [19], and furthermore: …*according to the United Nations (World urbanization prospects - 2014), approximately two-thirds of the world's population will be living in an urban area by 2050* [20].

In line with the cultural approach of the historical Bauhaus, the New European Bauhaus (NEB) initiative is also based on two main pillars: **Social innovations** on the one hand, and the **Best Available Technologies** on the other. Both pillars are important and must be

in order to address major issues in global economy, such as international financial stability, climate change mitigation, and sustainable development. The G20 is representing about 80% of gross world product (GWP), 75–80% of international trade, two-thirds of the global population, and roughly half the world's land area. The current members are listed as follow (in brackets the last year of presidency) Australia (2014), Canada (2010-1), Saudi Arabia (2020), United States (2008), India (2023), Russia (2013), South Africa (2025), Turkey (2015), Argentina (2018), Brazil (2024), Mexico (2012)' France (2011), Germany (2017), Italy (2021), United Kingdom (2009), China (2016) Indonesia (2022) Japan (2019), South Korea (2010-2).

[39] In terms of standards, the EU-led process successfully set global standards for 5G and the Internet of Things.

[40] *Ibidem* p. 7

[41] European Commission, COM(2020) 67 final, Brussels, 19.2.2020 - p. 13

considered within a combined, multidisciplinary approach, which also represents a powerful link between the Bauhaus movement of the early 20th century and the NEB. In the NEB approach, urban and social renovations are moving forward together, relying on the appropriate use of existing technologies, mainly related to the digital environment. NEB is always evidencing that cities need to be, above all, pleasant environments to live in, where the quality of citizen's life is a priority for policymakers and local administrators and any single persons must be involved in the good management of urban environment.

Those digital cities, facing the effects of climatic events and demographic challenges and more recently the health issues coming from present and probably future pandemics, needs to fully implement the principles of circular economy progressing towards the new vision sketched within the 2019 (R)evolving cities approach[42] [43].

Among the technologies supporting the NEB, the most promising one is the application of urban digital twin models. The first time the term digital twin was academically used seems to date back to 2002 when prof. Michael Grieves of the University of Michigan, described a digital system able to simulate all characteristics and conditions and of a product. With the progress of digital technology and the increasing demand of advanced technologies in many different areas, scientist and researchers was able to concretely realize the idea of a digital twin model (DTM) with possible application on several different domains.

The earliest versions of a Digital twin have been realised by NASA[44] in order to simulate the behaviour of advanced devices outside Earth's atmosphere. Early versions of the digital twin, therefore, focused mainly on the simulation aspect. Converging on built environment, and according to Sue Weeks, a Digital Twin could be defined as the transposition in a virtual/digital environment of a real-world object, with the aim to test its functionality and performance [21].

Digital Twins (DT) applied to build environments are conceived as three-dimensional databases, where all data and information, both static and dynamic contribution, for the creation of virtual models of buildings and their components as well as material qualities and all other helpful information simulating human and artificial activities and real-time management of processes.

The development of a CDT usually begins with the realization of a Building Information Model (BIM)[45], a three-dimensional database that communicates with data and sensors inside the building. The CDT acquires a certain level of self-learning through Artificial Intelligence algorithms, progressively developing predictive capabilities and enabling a certain level of autonomous decisions and actions based on the analyses performed. Upscaling the Digital Twin for a single object/building, to the level of a City Digital Twin (CDT) implies the expansion of the model developed at

[42] The (R)evolving city approach was proposed for the first time in the 2019 volume: *"La Città fragile: dalla Smart alla (R)evolving city",* (Cinquepalmi F.: Didapress, Firenze, 2019), and resumed later in 2021 in the volume "*Towards (R)evolving Cities: Urban fragilities and prospects in the 21st century" (*Cinquepalmi, F*,* Didapress, Firenze 2021).

[43] *The (R)evolving city guides its inhabitants in a kindly and maternal manner towards a new idea of citizenship. Its citizens, proactive agents of the 21st century evolution of urban systems, leave behind their predatory approach, evolving towards a higher level of awareness, integrating into the ecosystem and respecting mutual relationships. It is a "polite" city, inhabited by consciously polite citizens, educated in the principles of sustainable development as the basis for contemporary civil coexistence. They are well aware of the need to establish a new balance between human and social development, and environmental sustainability, carefully harmonizing present and future decisions. The relation between the city of tomorrow and its inhabitants will be significantly different: it will be based on a new and rational approach to land and soil management, reclaiming deteriorated neighbourhoods, and in the meantime involving citizens in daily decisions, taking into account their ongoing needs. (*Cinquepalmi, F*,* Didapress, Firenze 2021 p. 285).

[44] The National Aeronautics and Space Administration (NASA) is a United States federal agency, established in 1958, responsible for the civilian space program, as well as aeronautics, space and satellite research.

[45] The Building Information Modeling (BIM) is the methodology promoting the digital approach in the construction sector, placing at the centre of the process the univocity, transparency and coherence of the data during all the phases of the process. BIM is defining a database structured by parametric objects, characterised qualitatively and quantitatively, and contextually integrating the various disciplines. The result is a fundamental and univocal multi-dimensional tool to support integrated design, in which the players in the process collaborate within the same digital environment to improve the quality of the product obtained, experiencing considerable advantages in terms of time and costs. Cinquepalmi F. 2021 pp. 286-287

a single object/building level, not only to a larger scale but to an enormously larger level of managed data, including data and information geo-localized through Geographical Information Systems (GIS), but also coming from other sources like data generate by the EU Copernicus programme[46]. Information and data produced from every single object or from networks and other sources, indirectly produce additional data coming from the crossover information, and this real-time crossover and shared data are able to release both direct and indirect additional financial incomes[47].

The concept of DT implemented at urban environment scale gives rise to the concept of City Digital Twin (CDT), a virtual model which upgrades the single building approach to a higher and more complex level. The Digital Twin City is essentially able to improve and enrich the knowledge received through input data and signals coming from[48]. Clearly, any upscaling step of a Digital Twin could result very challenging, both for the huge amount of data to be potentially managed, and for the conceptual reengineering of the newer model to be developed. However, it is part of the DT architecture to decide the level of data and information to be considered, in order to obtain the desired results, avoiding to overflow the model with an excessive amount of data and information. Integration of DT technologies with machine learning technique and Artificial Intelligence systems will lead to a complete and automatic analyses and control of all BIG data coming from IoT (Internet of Things) devices. It is a bit surprising that at the moment, the actions proposed within the New European Bauhaus for built environment, while giving maximum emphasis to digital tools, do not give to the use of Digital Twins for management and improvement of built environments, the room we would expecting, even though globally, most advanced research and policies approaches are going exactly in that direction.

Presently the only official European commission programme that seems to make use of the Digital Twin methodology seems to be the *Destination Earth* project[49], developed together with the European Space Agency and with a more climate and environmental approach[50]. However, the Communication *COM(2021) 573 final*, recognize clearly that for the development and implementation of the New European Bauhaus, the Digital transition will play a fundamental role, together with all the advanced Digital tools, namely: 5G, Artificial Intelligence, data-based tools, robotics and 3-Dimensional printing technologies or digital twins in the construction industry, assisting in the improvement of sustainability performance of materials, products and buildings.

6. Conclusions

The transatlantic connections between Germany under the rule of the Republic of Weimar[51] and the United

[46] Copernicus is the European Union's Earth observation programme coordinated by European Commission and Member States in cooperation with several multilateral, EU and national Agencies. Established EU Regulation No 377/2014[2] in 2014, building on the previous EU's Earth monitoring initiative GMES (EU Regulation No 911/2010[3]). The programme it is aimed to achieve a global, continuous, autonomous, high quality, wide range Earth observation capacity for Europe. Providing accurate, timely and easily accessible information to, among other things, improve the management of the environment, understand and mitigate the effects of climate change, and ensure civil security.

[47] *"…greater data sharing could release an additional £7bn per year of benefits across the UK infrastructure sectors equivalentto 25% of total spend."*. Bolton A, Enzer M, Schooling J et al. *(*2018) [22]

[48] Cinquepalmi F. 2021, p. 228-229

[49] COM(2021) 573 final, p. 10

[50] An innovative project of the European Commission, developed together with ESA, for upscaling a digital twin is presently the "Destination Earth project" also known as DestinE. The initiative is mentioned in the EU Communication COM(2020)67final, among the key-actions designed for implementing the key-objective dedicated to *"An open, democratic and sustainable society"*. The main goal of DestinE is to develop a, "...*high precision digital model of Earth (a "Digital Twin of the Earth") that would improve Europe's environmental prediction and crisis management capabilities"*. Intended to be an implementing tool of the European Green Deal with the specific focus to use the potential of environmental, atmospheric, and climatic data and for achieving Green Deal priority actions on climate change, circular economy, pollution, biodiversity, and deforestation. This very ambitious project is proposing to create a digital model of the Planet, to record, monitor, and forecast natural and human activities in support of sustainable development policies and to*: "…bring together European scientific and industrial excellence to develop a very high precision digital model of the Earth"*. Craglia M., Nativi S.: ., (2021) [23]

[51] The Weimar Republic refers to the period of German history from 1918 to 1933 in which a parliamentary democracy existed in Germany for the first time, replacing the constitutional monarchy of the imperial era and beginning with the proclamation of the Republic on 9 November 1918. It ended de facto with the National socialist seizure of power, following Adolf Hitler's appointment as Reich

States are among the cultural contamination at the basis of the historical Bauhaus movement. American architects and sociologists had strong Academic connections with Germany in the period between 1918 and 1933. This is also the reason why the university of Chicago, as well as other Academic institutions in North America, was considered a suitable option for the *diaspora* of the Bauhaus architects and artists fleeing Germany in front of the national socialist regime. The School of Chicago[52] combining ethnography and sociological theory, along with architectural fieldwork in the challenging context of the industrial city of Chicago, represented an exceptional think-tank for the theoretical elaboration of urban sociology, strongly rooted in the vision of the German sociologists' Max Weber[53] and Georg Simmel[54]. In the years following the great fire of 1871[55], Chicago: *"...created distinctive urban forms that permitted new high-density use in the city core. Development of the skyscraper made possible vertical growth. Innovations in mass transit moved people out from the city core and accelerated the city's horizontal expansion. New towns and new housing styles were developed."* [24] (Figure 3).[56]. According to the Chicago school, the city must be conceived as a way of thinking, a set of customs and traditions, organized feelings and behaviours, interacting with each other, and passed down through generations as a piece of traditional knowledge.

Fig 3 - Bird view of the Chicago central business section in 1916.The old mostly wooden city was almost totally destroyed by fire in 1871, and the rebuilding process promoted studies and modernisation, making Chicago an urban living laboratory for architectural and social innovation between the end of XIX Century and the early XX. (Author of the image: Reincke, Arno B., 1916 propriety of US library of the Congress).

The city cannot be considered only as a physical mechanism or an artificial construction; it is involved in

Chancellor on 30 January 1933. The democratic structures were gradually dismantled by decrees of the Reich President on 4 February and 28 February and finally with the entry into force of the Enabling Act on 24 March 1933.

[52] In sociology, the work of the Chicago School in the 1920s and 1930s (sometimes also referred to as the "ecological school") are considered the foundation of urban sociology and urban environment research. The most prominent representatives of the Chicago School in the 1920s/1930s included Nels Anderson, Ernest Burgess, Ruth Shonle Cavan, Edward Franklin Frazier, Everett Hughes, Roderick D. McKenzie, George Herbert Mead, Robert E. Park, Walter C. Reckless, Edwin Sutherland, WI Thomas, Frederic Thrasher, Louis Wirth, and Florian Znaniecki. The school had strong ties and a great influence with the architectural school in Chicago, influencing architects and designers of the time among them Frank Lloyd Wright.

[53] Maximilian Karl Emil Weber (1864, † 1920) was a German sociologist, philosopher, jurist and political economist, deeply influenced theory and social research. Together with Émile Durkheim and Karl Marx, he is considered one of the founding fathers of sociology.

[54] Georg Simmel (1858 - 1918) was a German sociologist and philosopher, considered one of the founding fathers of sociology, together with Émile Durkheim and Max Weber. His work was inspirational to many and in many different ways and through the mediation of Robert Park he became a reference author for the Chicago School.

[55] The Great Chicago Fire was a disastrous fire in the city of Chicago that from 8 to 10 October 1871, destroyed approximately 9 km² of the city. More than 120 km of streets were destroyed, 190 km of pavements, 2 000 lampposts, 17 500 buildings, and 222 million dollars' worth of property, about one-third of the value of the entire city, that was mostly built in timber. Of 300 000 inhabitants, 90 000 were left homeless. After the extinguishment, 125 bodies were recovered, with an estimated total of 200-300 victims, which for the scale of the disaster was not too high a number.

[56] *"The city…is something more than a congeries of individual men and of social conveniences, streets, buildings, electric lights, tramways, and telephones, etc.; something more, also, than a mere constellation of institutions and administrative devices-courts, hospitals, schools, police, and civil functionaries of various sorts. The city is, rather, a state of mind, a body of customs and traditions, and of the organized attitudes and sentiments that inhere in these customs and are transmitted with this tradition. The city is not, in other words, merely a physical mechanism and an artificial construction. It is involved in the vital processes of the people who compose it; it is a product of nature, and particularly of human nature."* Park R.E. (1915) [25]

the vital processes of its inhabitants and is therefore a product of human nature and the natural environment

Ernest W. Burgess[57] [26] together with Robert E. Park[58] and Roderick Duncan McKenzie[59], analysed the idea of the city, defining the city as more than the mere sum of individuals, infrastructures, and economic activities, paving the road to the following studies of Max Weber[60], as summarized in "The City", his essay dedicated to this topic, but also approached from a different point of view by Georg Simmel in one of his most notable essays, *"The Metropolis and Mental Life" ("Die Großstädte und das Ge1916istesleben")* from 1903, where the author praised to: *"…the resistance of the individual to being levelled, swallowed up in the social-technological mechanism."*[27]

The interdisciplinary approach promoted both by the School of Chicago and the Historical Bauhaus, is probably the most important lesson that the New European Bauhaus needs to bear clearly in mind for its future development. A "New Deal[61]" for our highly urbanized Europe needs to integrate all available digital technologies with the most advanced policy approach for realizing a real social innovation, following the model and principles of the historical Bauhaus, as well as the extraordinary experience of the School of Chicago.

In the complex and challenging framework of contemporary urban societies, threatened by climatic, demographic, and political challenges, Artificial intelligence and advanced digital technologies are too essential tools for building a better future for Europe to be only left to the capacities of technologists and engineers[62]. Creativity and humanities must play a fundamental role, not only involving artists and

[57] Ernest Watson Burgess (1886 - 1966) was a sociologist of Canadian origin. After teaching at various American universities in the Middle West, he became a professor of sociology in Chicago in 1927, where he gathered the so-called Chicago School around himself and Robert Park. Burgess participated intensively in activities related to academic life and social research, making in particular a valuable contribution to the study of urban phenomena.

[58] Robert Ezra Park (1864-1944) was an American urban sociologist, and one of the most influential figures of early American sociology. Park was an innovator in the field of sociology, moving the discipline from a philosophical approach towards an active discipline based on the study of human behaviour and urban communities. Professor at the University of Chicago from 1914 to 1933, he played a leading role in the development of the Chicago School of Sociology, promoting studies on human ecology, human migration, cultural assimilation, social movements and social disorganisation. His 1925 work 'The City: Suggestions for the Study of Human Nature in the Urban Environment' is considered a milestone in urban sociology.

[59] Roderick Duncan McKenzie (1885 –1940) was a Canadian-American sociologist. Ph.D. student under Robert E. Park, e later became head of the sociology department at the University of Michigan. He served as the 2nd Vice-President of the American Sociological Association (ASA) in 1932–1933, and was a charter member of the Sociological Research Association. From 1930 until his death in 1940, he was enlisted by president Herbert Hoover to research urban trends for The President's Research Committee on Social Trends. His research for that project was published as *The Rise of Metropolitan Communities.*

[60] Maximilian Karl Emil Weber (1864 - 1920) was a German sociologist, philosopher, jurist and political economist. His ideas had such a profound influence on social theory and research that he is considered, along with Emile Durkheim and Karl Marx, to be one of the founding fathers of sociology.

[61] The New Deal, in the United States between 1933 and 1939, was a series of programmes, public works projects, financial reforms and regulations promoted by President Franklin D. Roosevelt. Involving almost all federal agencies and governmental bodies, called to provide support to farmers, and urban unemployed people of any age. The New Deal included new constraints and protections for the banking industry and efforts to reintegrate the collapse of the US economy between 1929 and 1933. Based on the economic theories of UK economist John Maynard Keynes, the New Deal programmes included both laws passed by Congress and presidential executive orders during the first term of Franklin D. Roosevelt's presidency, and focused on what historians call the "3 Rs": Assistance to the unemployed and poor, Recovery of the economy to normal levels, and Reform of the financial system to prevent a recurrence of the depression.

[62] The conflict between technology and humanity, between depersonalization and individualism that is at the inner core of the modern idea of the city, is well understood and interpreted by George Simmel, and in his essay *"The Metropolis and Mental Life"* he recognizes in one hand that: *"…In the conflict and shifting interpretations of these two ways of defining the position of the individual within the totality is to be found the external as well as the internal history of our time. It is the function of the metropolis to make a place for the conflict and for the attempts at unification of both of these in the sense that its own peculiar conditions have been revealed to us as the occasion and the stimulus for the development of both.".* However, Simmel concludes by noting that the conflict is also an inextricable part of the solution, stating that:

designers in the process of policy definition but also through the close engagement of sociologists, anthropologists, and probably also philosophers, in order to assure that the extraordinary vision of President Ursula von der Lynen for a New European Bauhaus, would not risk getting overwhelmed by an excess of technology, "*…swallowed up in the social-technological mechanism*[63]*",* and the technology itself must remain deeply rooted at the service of humanity. The most appropriate conclusion to this essay is a quote from Gropius himself, which sounds also highly relevant for the new European Bauhaus:

The intellectual groundwork of a new architecture is already established. What, metaphorically speaking, might be described as the bench-tests of its components have now been completed. There remains the task of imbuing the community with a consciousness of it and its essential rightness: a task which will devolve upon the uprising generation[64]*.*

Walter Gropious

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Bibliography

[1] von der Leyen, U. *Political guidelines for the upcoming five years to the Members of European Parliament*. Strasbourg (FR) 16 July 2019. p. 4

[2] European Commission, *Communication from the Commission to the European parliament, the European council, the Council, the European economic and social committee and the Committee of the Regions: The European Green Deal,* COM(2019) 640 final, Brussels 11.12.2019

[3] European Commission, *Regulation (EU) 2021/1119 of the European parliament and of the council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), Brussels, 30 June 2021.*

[4] von der Leyen, U. *State of the Union Address 2020*, 16 September 2020 – European Parliament Assembly Hall, Strasbourg 2020

[5] Pevsner, N., *Storia dell'architettura europea,* Laterza Bari, ed 1974. p. 272-273.

[6] Gropius, W., *The new architecture and the Bauhaus*, the M.I.T. press, Massachusetts Institute of Technology Cambridge, Massachusetts, 1961, p- 89 (Versione originale in tedesco: *"Die neue Architektur und das Bauhaus",* 1935

[7] European Commission: *Communication from the Commission to the European parliament, the European council, the Council, the European economic and social Committee and the Committee of the Regions - Europe's moment: Repair and Prepare for the Next Generation*, COM (2020) 456 final, Brussels, 27.5.2020

[8] Schellnhuber, H. J. (rapporteur), Widera, B. (rapporteur), Kutnar A. (rapporteur), Organschi A. (rapporteur), Hafner A. Hillebrandt A., Murphy O., Nakicenovic O.: *Horizon Europe-New European Bauhaus* (Nexus Report). Conclusions of the High-Level Workshop on 'Research and Innovation for the New European Bauhaus', jointly organised by DG Research and Innovation and the Joint Research Centre, Luxembourg: Publications Office of the European Union, 2022.

[9] Cinquepalmi, F.: *Towards (R)evolving Cities: Urban fragilities and prospects in the 21st century*, Didapress, Firenze 2021.

[10] Pylsy, P., Lylykangas, K., Kurnitski J.: Buildings' energy efficiency measures effect on CO2 emissions in combined heating, cooling and electricity production, *Renewable and Sustainable Energy Reviews*, *134*, Elsevier 2020.

[11] Mecca S. *Urban fragilities in the 21st century*, in Cinquepalmi, F.: *Towards (R)evolving Cities*. Didapress 2021 p. 13.

[12] UN General Assembly: *Transforming our World: the 2030 Agenda for Sustainable Development* (A/RES/70/1), New York, 2015.

[13] European Commission*, Decision C(2022)2975 of 10 May 2022, Horizon Europe Work Programme* 2021-2022, General Introduction, Bruxelles, 2022. p. 5

[14] Schellnhuber, H. J. (rapporteur); Widera, B. (rapporteur); Kutnar, A. (rapporteur); Organschi, A. (rapporteur); Hafner, A.; Hillebrandt, A.; Murphy, O.; Nakicenovic, O.: Luxembourg, 2022, Horizon Europe-*New European Bauhaus Nexus Report,*2022 p. 7.

[15] European Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: a Digital Agenda for Europe*, COM(2010)245 final, Brussels, 19.5.2010.

[16] Communication from the Commission: EUROPE 2020 *a strategy for smart, sustainable and inclusive growth*, COM(2010) 2020 final, Brussels, 3.3.2010

[17] European Commission: *Communication from the Commission to the European Parliament, the Council, the European Economic, and Social Committee, and the Committee of the Regions: Shaping Europe's digital future*, COM(2020) 67 final, Brussels, 19.2.2020

[18] European Commission: *Communication from the Commission to the European Parliament, the Council, the European Economic, and Social Committee, and the Committee of the*

"…they attain a quite unique place, fruitful with an inexhaustible richness of meaning in the development of the mental life." Simmel G.: op. cit. p. 19.

[63] Simmel G.: op.cit. p. 11

[64] Gropius W. Op. Cit. p. 111

Regions: Shaping Europe's digital future, COM(2020) 67 final, Brussels, 19.2.2020 - p. 13

[19] United Nations Department of Economic and Social Affairs, UNDESA 2009, *Urban and rural area* (UNDESA).

[20] Kotzeva M. (Chief editor) et al. (2016). *Europe statistics on cities, towns and suburbs,* Eurostat, European Union Publications, Luxembourg.

https://ec.europa.eu/eurostat/documents/3217494/7596823/KS-01-16-691-EN-N.pdf

[21] Weekes S. 2019, *The rise of digital twins in smart cities*, SmartCities- World, on line platform (www.smartcitiesworld.net)

[22] Bolton A, Enzer M, Schooling J et al. *The Gemini Principles: Guiding values for the national digital twin and information management framework*, Centre for Digital Built Britain and Digital Framework Task Group, 2018 (*http://creativecommons.org/licenses/by/3.0).* p. 2.

[23] Craglia M., Nativi S. *Destination Earth - Ecosystem Architecture Description*, JRC technical report. Luxembourg: Publications Office of the European Union, 2021. p. 6.

[24] Miller, H.C.: *The Chicago School of Architecture: A Plan for Preserving a Significant Remnant of America's Architectural Heritage,* by United States Department of the Interior, National Park Service, U.S. Government Printing Office, Washington, D.C., 1973 p. V

[25] Park R.E. 1915, *The City: Suggestions for the Investigation of Human Behavior in the City Environment*, in ≪The American Journal of Sociology≫, vol. 20, n. 5.*it.* 1915 p. 1.

[26] Burgess E.W. *et al.* 1992, *The Growth of the City. Suggestions for Investigation of Human Behavior in the Urban Environment*, Chicago University Press, Chicago.

[27] Simmel, G. *The Metropolis and Mental Life (1903)* in Gary Bridge and Sophie Watson, eds. The Blackwell City Reader. Oxford and Malden, MA: Wiley-Blackwell, 2002. p. 11

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