

# Urban Regeneration: What Are the Architectural Trends?

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**Abstract.** Many cities suffer overpopulation and the presence of obsolete underutilised areas which sometimes are located in central city areas. Urban regeneration is an effective tool to “breathe life” into such spaces. Urban regeneration has become common in the last few decades; there are many successful cases of implemented or planned urban regeneration worldwide. The Authors of this paper study such best practices in order to identify current architectural trends in urban regeneration, which contribute to the creation of more green, resilient, sustainable, safe, accessible urban areas. The case studies shown in this article are the winning projects of the C40 Reinventing Cities competition, which is a global competition that was established to accelerate the development of decarbonised and resilient urban regeneration across the globe. This paper contributes to the knowledge through highlighting five architectural trends which are the most common and crucial for facilitating positive urban regeneration processes.

**Keywords:** Urban regeneration, architectural trends, sustainable development, QCA methodology, Reinventing Cities, sustainable cities.

## 1 Introduction

Urban regeneration, or urban renewal, is the process of reusing resources and rebuilding urban environment [1]. Regeneration processes all around the world are initiated to transform urban areas into more liveable and vibrant neighbourhoods and use the best applied practices as role models for wider city-scale [2]. Urban regeneration provides a new opportunity of rethinking the use of the space [3]. Urban regeneration is an effective means to address such urban challenges as urban sprawl, inadequate urban space, depopulation, criminogenic environment, etc. [4, 5]. Moreover, urban regeneration has been recognised as one of the most effective tools for making resilient, sustainable, inclusive, safe, and comfortable cities [2]. Zheng et al. [1, 6] state that urban regeneration contributes to sustainable development if it follows sustainable principles. Robert et al. [7] argue that

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urban regeneration aims at continuous improvement of urban areas across the multiple aspects of cultural, social, economic, and physical environment, which are overlapping with the pillars of sustainable development.

The concept of sustainable development emerged due to the rapid growth in the urban population. In 2018, 55% of the world's population lived in urban areas, and this proportion is expected to increase to 68% by 2050 [8]. Considering this, urban territories should be able to accommodate more people in the nearest future. Cities will grow extensively or intensively. The extensive development way implies expanding the existing boundaries of urban agglomerations [9], which can be complicated in Europe, where countries have very limited territories. The agglomerations' growth requires more complex governance and spatial planning. While the intensive way means the improvement of existing facilities, the use of technological progress for development, the creation of new services and spaces inside the existing urban realm [9]. Sustainable development is applicable for both extensive and intensive urban development, while urban regeneration means following the intensive strategy. Nevertheless, both sustainable development and urban regeneration aim to make cities and urban areas safe, comfortable, resilient, and liveable [4]. Urban regeneration is a trend of contemporary cities' development, which must become suitable for citizens, guaranteeing them excellent services, reduced consumption of resources and energy [10]. The development of a new architectural approach appears to be the real goal to be achieved.

Urban regeneration has been popular in the last few decades, especially in big developing countries, such as China and Russia [4]. In Russia, in 2019 the national project "Housing and Urban Environment" was established, one of the main goals of which is urban regeneration on the nationwide scale. In China, sustainable urban regeneration faces many problems and sometimes looks more like "superficial renewal" [11]. Thus, the Authors of this paper aim to study best practices of successful sustainable urban regeneration and to highlight the most common trends of the architectural solutions through which the regeneration is implemented.

Generally, the key principles of urban renewal are considered to be as follows: reviving nature in cities; decarbonisation; decentralisation of city core and services; making small scalable interventions; hybrid ways of living, considering nature as key aspect; using modern technologies to anticipate, prevent, and mitigate effects of the climate change; inclusion, "cities for all"; correlation of cities' systems [2].

Urban regeneration is an integrative process and a city planning instrument that reflects the trends of modern architecture [2]. Nevertheless, many researchers argue that the process of urban regeneration is not limited to only architectural tools and methods [1, 12, 13]; it integrates governance, land use, partnerships, multidisciplinary working. Therefore, the regeneration must consider economic, social, cultural, and environmental factors. Thus, the Authors will study architectural trends in urban regeneration in terms of their economic, social, cultural, and environmental feasibility.

To summarise, the objectives of this paper are the following:

- Study international best practices in urban regeneration,
- Identify current architectural trends in urban regeneration, which contribute to the creation of more green, resilient, sustainable, safe, accessible urban areas,
- Highlight which of the trends are the most common and crucial for facilitating positive urban regeneration processes.

## **2 Methods**

Based on the objectives highlighted above, the Authors study international best practices in urban regeneration, namely the winning projects of the Reinventing Cities competition [14].

In general, architectural competitions have become very popular in larger urban development projects [13]. Through various competitions, architecture makes a crucial step to the creation of entrepreneurial policies that are changing the material and social fabric of the city [13].

Reinventing Cities is a global competition that was established to accelerate the development of decarbonised and resilient urban regeneration across the globe [14]. Among the participating cities are: Auckland, Bologna, Bristol, Cape Town, Chicago, Houston, Izmir, Lyon, Madrid, Milan, Montreal, Naples, Oslo, Paris, Phoenix, Reykjavik, Rome, San Francisco, San Paolo, and Singapore. When applying to this Competition, cities identify disused territories that are ready to be renewed and modified and invite multidisciplinary teams, who can propose an architectural and development project to regenerate the site.

The Authors made a selection of 13 out of 39 winning projects of the Reinventing Cities competition, which constitutes 33.3% of the winning projects. The selected cities, where urban regeneration projects will be implemented, are located in Europe and in the USA. This was made to get the full picture of the urban regeneration architectural trends.

In order to identify current architectural trends in urban regeneration, which contribute to the creation of more green, resilient, sustainable, safe, accessible urban areas, the paper studies these best practices according to the following criteria: type of new use; architectural scale; sense of place preservation; biodiversity, green infrastructure, vegetation, urban gardening; accessibility; vernacular solutions; type of heritage preservation; sustainable solutions; shared public spaces.

The explanation of the architectural solutions presented in the winning projects of the competition is provided below.

#### 1. Chicago “Downtown Loop Site”

- Former use – Garage,
- Type of new use – new mixed use (residential block with co-working spaces, restaurants, green area),
- Architectural scale – enlarged scale,
- Sense of place preservation – preserved (facade of the new building reminds the facade of the former garage),
- Creation of biodiversity – presented,
- Accessibility – provided (all spaces in the ground level are accessible),
- Green infrastructure, vegetation – public,
- Use of vernacular solutions – no data,
- Preservation of heritage – demolition,
- Sustainable solutions – presented,
- Shared public spaces – presented (offices and meeting halls for local non-profit groups),
- Urban gardening – presented.

#### 2. Madrid “Barrio del Aeropuerto”

- Former use – empty brownfield,
- Type of new use – new mixed use (rental house, apartments, co-working, cafeteria, stores, laundry, skate park),

- Architectural scale – human scale,
  - Sense of place preservation – no,
  - Creation of biodiversity – presented,
  - Accessibility – provided,
  - Green infrastructure, vegetation – public,
  - Use of vernacular solutions – no data,
  - Preservation of heritage – new construction,
  - Sustainable solutions – presented,
  - Shared public spaces – presented (shared services),
  - Urban gardening – presented (green roofs and facades with the possibility of including common areas or urban orchards).
3. Madrid “Vicalvaro”
- Former use – empty useless land,
  - Type of new use – new single use (factory for manufacturing biodegradable zinc-air batteries),
  - Architectural scale – human scale,
  - Sense of place preservation – no,
  - Creation of biodiversity – presented,
  - Accessibility – not provided (the factory has private territory),
  - Green infrastructure, vegetation – private,
  - Use of vernacular solutions – no data,
  - Preservation of heritage – new construction,
  - Sustainable solutions – presented,
  - Shared public spaces – not presented,
  - Urban gardening – presented.
4. Madrid “Villaverde”
- Former use – empty useless land,
  - Type of new use – new mixed use (residences, a music factory, sports areas, canteen-stage, auditorium, food services, organic store, industrial plot, offices),
  - Architectural scale – human scale,
  - Sense of place preservation – no,
  - Creation of biodiversity – presented,
  - Accessibility – provided (accessible public places),
  - Green infrastructure, vegetation – public,
  - Use of vernacular solutions – no data,
  - Preservation of heritage – new construction,
  - Sustainable solutions – presented,
  - Shared public spaces – presented,
  - Urban gardening – presented (productive landscape to foster local production).
5. Milan “Scuderie de Montel”

- Former use – historic stables,
- Type of new use – new single use (thermal activity centre),
- Architectural scale – human scale,
- Sense of place preservation – yes,
- Creation of biodiversity – not presented,
- Accessibility – not provided,
- Green infrastructure, vegetation – private,
- Use of vernacular solutions – sufficient use (thermo-insulating wood fibre and wooden frame structures),
- Preservation of heritage – adaptation,
- Sustainable solutions – presented,
- Shared public spaces – not presented,
- Urban gardening – not presented.

#### 6. Milan “Nodo Bovisa”

- Former use – empty useless land, industrial site, railway tracks,
- Type of new use – new mixed use (green and built public squares),
- Architectural scale – human scale,
- Sense of place preservation – yes,
- Creation of biodiversity – presented,
- Accessibility – provided (the project is a connection between existing buildings and areas; concept based on the 15-minute city logic),
- Green infrastructure, vegetation – public,
- Use of vernacular solutions – no data,
- Preservation of heritage – adaptation,
- Sustainable solutions – presented,
- Shared public spaces – presented,
- Urban gardening – not presented.

#### 7. Milan “Crescenzago”

- Former use – car parking,
- Type of new use – new mixed use (housing with shared services),
- Architectural scale – human scale,
- Sense of place preservation – no,
- Creation of biodiversity – presented,
- Accessibility – provided,
- Green infrastructure, vegetation – public,
- Use of vernacular solutions – no data,
- Preservation of heritage – new construction,
- Sustainable solutions – presented,
- Shared public spaces – presented (shared community spaces),
- Urban gardening – presented (vegetable gardens and orchards).

## 8. Milan “Piazzale Loreto”

- Former use – square,
- Type of new use – new mixed use (business centre with kindergarten, co-working spaces, and community spaces),
- Architectural scale – human scale,
- Sense of place preservation – no,
- Creation of biodiversity – presented (urban reforestation),
- Accessibility – provided,
- Green infrastructure, vegetation – public,
- Use of vernacular solutions – yes (hybrid wooden structures),
- Preservation of heritage – adaptation,
- Sustainable solutions – presented,
- Shared public spaces – presented,
- Urban gardening – not presented.

## 9. Milan “Scalo Lambrate”

- Former use – industrial site,
- Type of new use – new mixed use (square with different functional zones),
- Architectural scale – human scale,
- Sense of place preservation – no,
- Creation of biodiversity – not presented,
- Accessibility – provided,
- Green infrastructure, vegetation – public,
- Use of vernacular solutions – no data,
- Preservation of heritage – demolition and new construction,
- Sustainable solutions – presented,
- Shared public spaces – presented,
- Urban gardening – presented.

## 10. Montreal “4000 rue Saint Patrick”

- Former use – industrial site,
- Type of new use – new mixed use (artistic, entrepreneurial, and technological hub),
- Architectural scale – human scale,
- Sense of place preservation – yes,
- Creation of biodiversity – presented,
- Accessibility – provided,
- Green infrastructure, vegetation – both private and public,
- Use of vernacular solutions – mainly wooden building structures,
- Preservation of heritage – adaptation,
- Sustainable solutions – presented,
- Shared public spaces – presented (shared hubs),

- Urban gardening – presented (the creation of a large greenhouse, urban gardening).

#### 11. Reykjavik “Lagmuli”

- Former use – car parking,
- Type of new use – new mixed use (residential co-living and co-working spaces),
- Architectural scale – human scale,
- Sense of place preservation – no,
- Creation of biodiversity – not presented,
- Accessibility – provided,
- Green infrastructure, vegetation – public,
- Use of vernacular solutions – vernacular materials (Icelandic stone wool, which is produced locally, as well as timber cladding and cross-laminated timber),
- Preservation of heritage – new construction,
- Sustainable solutions – presented,
- Shared public spaces – presented,
- Urban gardening – presented (the creation of a greenhouse area).

#### 12. Rome “Roma Tuscolana”

- Former use – industrial site near a railway track,
- Type of new use – new mixed use (residences, offices, flexible spaces, a student hotel, an energy centre and retail),
- Architectural scale – human scale,
- Sense of place preservation – no,
- Creation of biodiversity – presented,
- Accessibility – provided,
- Green infrastructure, vegetation – both private and public,
- Use of vernacular solutions – not used,
- Preservation of heritage – demolition and new construction,
- Sustainable solutions – presented,
- Shared public spaces – presented,
- Urban gardening – not presented.

#### 13. San Francisco “Meeting Place & Public areas”

- Former use – car park,
- Type of new use – new mixed use (underground farm with spaces for playing, social activities, and community gatherings),
- Architectural scale – human scale,
- Sense of place preservation – yes,
- Creation of biodiversity – presented,
- Accessibility – provided,
- Green infrastructure, vegetation – public,
- Use of vernacular solutions – not used,

- Preservation of heritage – adaptation,
- Sustainable solutions – presented,
- Shared public spaces – presented,
- Urban gardening – presented (vertical farms).

### 3 Results

The last goal of this paper was set as follows: “highlight which of the trends are the most common and crucial for facilitating positive urban regeneration processes”. The Authors use Qualitative Comparative Analysis (QCA) methodology to address this aim. The methodology was designed for analysis of various cases in multiple situations [15]. It is designed for the application with a medium number of cases – usually between 10 and 50 (15). The QCA methodology is an appropriate tool which allows to identify architectural trends among the criteria for the best practices analysis.

The QCA methodology is based on the assumption that a development is often the result of various interlacements of criteria, rather than only one single criterion [15]. The methodology can be used to develop performance process and planning in the future [15].

The set of factors that contribute to the identification of architectural trends based on the analysis of best practices is presented in Table 1. The presence or absence of any factors contributes to the architectural trends. The majority of factors are objective, such as the type of new use, the accessibility of spaces, the use of vernacular solutions, the type of heritage preservation, etc. While some of the factors are subjective, for instance, the type of the architectural scale (human scale or enlarged scale) or the creation of sense of place.

The scoring is based on the “crisp-set” developed by Ragin [15]. The score is either “1” or “0”, where “1” means the presence of the factor in a case study, while “0” means the absence. The scoring of the subjective factors is based on the Authors’ opinion.

**Table 1.** Score of the factors which contribute to urban regeneration architectural trends.

Factors	Reinventing Cities competition winning projects													Total score (max.13)
	1	2	3	4	5	6	7	8	9	10	11	12	13	
New single use	0	0	1	0	1	1	0	0	0	0	0	0	0	3
New mixed use	1	1	0	1	0	0	1	1	1	1	1	1	1	10
Human scale of architecture	0	1	1	1	1	1	1	1	1	1	1	1	1	12
Enlarged scale of architecture	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Sense of place	1	0	0	0	1	1	0	0	0	1	0	0	1	5
Creation of biodiversity	1	1	1	1	0	1	1	1	0	1	0	1	1	10
Accessible public spaces	1	1	0	1	0	1	1	1	1	1	1	1	1	11
Private green infrastructure	0	0	1	0	1	0	0	0	0	1	0	1	0	4
Public green infrastructure	1	1	0	1	0	1	1	1	1	1	1	1	1	11



<b>Vernacular materials</b>	0	0	0	0	1	0	0	1	0	1	1	0	0	4
<b>Local construction materials</b>	0	0	0	0	0	0	0	1	0	1	1	0	0	3
<b>Preservation of heritage: restoration</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Preservation of heritage: adaptation</b>	0	0	0	0	1	1	0	1	0	1	0	0	1	5
<b>Preservation of heritage: demolition</b>	1	0	0	0	0	0	0	0	1	0	0	1	0	3
<b>New construction</b>	0	1	1	1	0	0	1	0	1	0	1	1	0	7
<b>Sustainable solutions</b>	1	1	1	1	1	1	1	1	1	1	1	1	1	13
<b>Shared public spaces</b>	1	1	0	1	0	1	1	1	1	1	1	1	1	11
<b>Urban gardening</b>	1	0	1	1	0	0	1	0	1	1	1	0	1	8

For the analysis of the data set presented in Table 1, the Authors present factors in descending order of priority:

- Discovered in all projects:
  - Sustainable solutions
- Discovered in over half of the projects (total score no less than 7):
  - Human scale of architecture
  - Accessible public spaces; public green infrastructure; shared public spaces
  - New mixed use; creation of biodiversity
  - Urban gardening
  - New construction
- Discovered in fewer than half of the projects:
  - Sense of place preservation; preservation of heritage: adaptation;
  - Private green infrastructure
  - Vernacular materials
  - New single use; local construction materials; preservation of heritage: demolition
  - Enlarged scale of architecture
- Not discovered in the projects:
  - Preservation of heritage: restoration

The Authors argue that the factors, which were discovered in all the projects and in over half of the projects, can be considered as architectural trends in urban regeneration.

## 4 Discussion

This research discovered that accessibility of urban areas is one of the main goals which should be achieved through the regeneration. This was stated also by Chitrakar et al. [12].

Also, many researchers state that sustainability should be a goal of urban regeneration in all regenerated urban areas all around the world [1, 2, 4]. The importance of sustainable development was also proved by the study of the best practices in this research. This statement also works backwards, in the sense that urban renewal provides valuable opportunities for sustainable development [1, 16]. In this way sustainability includes the creation of green areas, urban gardening, and the encouragement of biodiversity.

This research discovered the importance of mixed-use spaces as well as Camboim et al. [17]. The scholars also argued the significance of mixed-use buildings with divided use of private and public spaces, which was typical for a number of the analysed projects in this paper.

## **5 Conclusions**

This study analysed European and American architectural trends in urban regeneration. The analysis shows that urban regeneration requires different approaches in different contexts, because there are no cases with similar characteristics (see Table 1). Urban regeneration may require redevelopment of brownfields, adaptation of heritage buildings, reconstruction of underused sites, reuse, heritage preservation, space reactivation, etc. Best practices show that urban regeneration has the power to transform obsolete areas into liveable, vibrant, sustainable, comfortable, and thriving spaces. In this way urban regeneration is used as an effective tool to prepare urban areas to face changes in urban population [18].

First, the conducted analysis highlights that urban regeneration should be performed under the concept of sustainable development; that is the main architectural trend of urban regeneration, which was discovered by the Authors. Nevertheless, the concept of sustainable development is no longer limited to the physical changes of urban territories and buildings; it should also cover intangible aspects, such as sense of place preservation [19].

Second, the creation of human scale architecture is another trend in urban regeneration. Regenerated places are created for the sake of comfort and well-being, while the creation of enlarged scale architecture does not support this motto.

Third, the creation of public, open for all, and accessible places is one of the main trends in urban renewal. All the studied best practices promote urban eco-efficiency and the creation of biodiversity. Cities are becoming to look more like natural parks and less like concrete jungle. It is a trend that the urban population desires to return to the roots and live in a natural environment, even staying in the city.

The forth trend is that buildings and areas are regenerated to mixed use rather than single use. Among the most common functions are co-working spaces, community spaces, and spaces for children. These functions are added to residential buildings, business hubs, classic offices, etc.

The fifth architectural trend in urban regeneration is the promotion of urban agriculture. Architects create urban farms in public parks, near residential buildings, on the site of a former multi-storey car parking, in business hubs, etc.

To summarise, this paper highlighted five architectural trends in urban regeneration. Each of these trends promotes better living environment in cities which grow intensively. The Authors strongly believe that architects, who work on urban regeneration, following these trends, will be able to facilitate positive and successful urban regeneration processes.

## References

1. Reference 1 H.W. Zheng et al., *Env. and Plan. B: Urb. An. and C. Sci.* **44** 5 (2016)
2. UN Habitat, *Urban regeneration as a tool for inclusive and sustainable recovery, Report of the Expert Group Meeting*, (2021)
3. J. Evans, P. Jones, *Env. and Plan. A: Econ. and Sp.* **40** 6 (2009)
4. Y. Liu et al., *Hab. Int.* **138** (2023)
5. Y. Liu et al., *Hab. Int.* **41** (2014)
6. H.W. Zheng et al., *Hab. Int.* **41** (2014)
7. P. Roberts et al., *Urb. Reg.* **9** (2000)
8. United Nations, *World Urbanization Prospects: The 2018 Revision* (2018)
9. Paraskevov, A. Chemarina, *Leding Potential for the Intensive Development of a City*, Proceedings of the 6th International Conference on Social, economic, and academic leadership (ICSEAL-6-2019), (2020)
10. Ciaramella, M. Dall’Orso, “Intelligent” Urban Regeneration: Global Trends and Challenges, In: *Urban Regeneration and Real Estate Development (Springer Briefs in Applied Sciences and Technology)*. Springer, Cham, 2021)
11. K.X. Xu et al., *Sustainability* **11** 2 (2019)
12. R.M. Chitrakar et al., *Cities* **131** (2022)
13. Bern, P.G. Roe, *Cities* **127** (2022)
14. C40 Reinventing Cities. Available at: <https://www.c40reinventingcities.org>
15. Ragin, *What is Qualitative Comparative Analysis (QCA)?* (intrac for civil society, 1984)
16. E. Chan, G.K.L. Lee, Critical factors for improving social sustainability of urban renewal projects, *Soc. Indic. Res.* **85** (2008)
17. G.F. Camboim et al. *Tech. Forec. & Soc. Ch.* **142** (2019)
18. T. Shen at al. *Land Use Pol.* **108** (2021)
19. Couch, *Urban Renewal: Theory and Practice* (Macmillan International Higher Education, 1990)