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# Post-industrial areas on the lens of Systemic Design towards flourishing urban resilience

Carolina Giraldo Nohra<sup>a\*</sup>, Silvia Barbero<sup>b</sup>

<sup>a</sup> Department of Architecture and Design , Politecnico di Torino

<sup>b</sup> Department of Architecture and Design, Politecnico di Torino

\* Corresponding author e-mail: carolina.giraldo@polito.it

Over the years, our economy has evolved into a global multidimensional process that has manifested itself in cities through radical changes in human population densities and urban fabric, this has resulted in the rise of post-industrial cities on that complex scenario, how can Systemic Design approaches in post-industrial areas can foster Circular Economy frameworks to address the current environmental and economic challenges of society? This paper aims to delve into a better comprehension on Post-industrial areas on the lens of the Systemic Design as an expertise to identify Circular Economy strategies which are economically self-sustaining. In order to foster resilient livelihoods for the economic, ecological and social regeneration of deprived urban areas result of deindustrialization processes. To exemplify this, it is intended to examine the case study of the post-industrial area of Mirafiori sud in Turin, Italy.

**Keywords:** Systemic Design, Circular Economy, Urban Transitions, Post-industrial , Sustainable Development.

## 1. Introduction

Over the years, our economy has evolved into a global multidimensional process that has manifested itself in cities through radical changes in human population densities and urban fabric. Such transformations are so rapid that not all cities can cope with the demands of the market and population. This drastic shift has left many formerly manufacture/extractive or Fordist cities with deprived and outdated urban fabric, this has resulted in the rise of post-industrial cities (ICLEI, 2018).

In the past, these precincts flourished socially and economically due to stable industrial relations, which delivered social welfare and local consumption systems (Kazepov, 2005). These upcoming industries based on "Fordist cities" witnessed an accelerated development of industrial infrastructure such as; factories, warehouses, railroads, and harbors, parallel to this came de massive development of social welfare facilities such as housing, schools and recreational areas (Cucca & Rancci, 2017).

As global economic trends evolve in the last 30 years towards a dematerialized/service-based economy, these Fordist cities suffered the negative consequences of this brutal shifts. From a market demand perspective, these precincts urban fabric couldn't cope with the transitioning industry, generating economic recession, rising unemployment, and population decline. As a result, this flourishing neighborhoods turned into desolate areas with predominantly brownfields and outdated urban fabric. Over time this phenomenon highlighted the trend on the disconnection between economic growth and social welfare (Cucca & Rancci, 2017). Such accelerated changes lead to acknowledging these urban environments as challenging precincts to address sustainable development issues (Bulkeley et al., 2011).

Many post-industrial cities face the pressing of revamping infrastructure and services with the purpose of meeting their current and future needs. To surpass the systemic outcomes of deindustrialization, it is imperative for these areas to re-frame their urban identity in order to boost urban transitions on restoring sustainable livelihoods (ICLEI,2018). Hence, to support such post-industrial legacy it must be approached as 'hubs' for radical innovation towards flourishing resilient cities (Ernstson et al., 2010; Bulkeley and Broto, 2012). Therefore, is important to consider such cities as ecosystems that contain individual and embedded systems from three interconnected spheres: the natural, built and socio-economic environment (McDonnell et al., 2009). This perspective addresses a holistic overview of the geographical and socio-cultural idea of the city, focusing on the dynamic feedback relationship that interacts within the post-industrial precincts and the city ecosystems (Ernstson et al., 2010)

On that view, the Sustainable Development Goals (SDG) trace an important roadmap for the post-industrial urban environment.Specifying that resilient and inclusive cities shall ensure sustainable consumption and growth patterns. To address that goal cities will have to go towards a Circular Economy (CE) a new paradigm which is gaining momentum, in order tackle the systemic consequences of deindustrialization and convene for a long-term transition on sustainable resource consumption. Furthermore, this will serve to overcome the existing contradiction between economic growth and sustainable development in urban environments (Pomponi, 2017).

Taking into account that, “Cities are not actors; they are places where people and economic activities are concentrated; complex social, economic and physical systems” (Otto-Zimmermann, 2011). To approach such complexity in areas with post-industrial legacy, it is very likely to undertake them with anticipatory strategies. “The more complex the network is, the more complex its pattern of interconnections, the more resilient it will be of our context” (Capra, 1996). On that view Design as a discipline is evermore approaching complexity fields with diverse ways of application (Jones & VanPatter, 2009), such as design thinking, participatory and systemic perspectives. These design initiatives are particularly sensitive to the SDG goals fostering a transition towards a more resilient and sustainable society. (Buchanan, 1992). Those practices have proved that the combination of technology, design and social organization can generate new mechanisms to regenerate these deprived areas.

These precincts which are facing local and global challenges must enable a shift in the way they have been undertaken, it is important to introduce a profound holistic vision which can make more comprehensible the complexity of urban context (Grimm et al. 2000; Mehmood 2010; Newman 1999). On this critical urban fabric, how can these scenarios reach an inclusive, sustainable and cohesive urban resilience, that can decrease future economic, environmental and social costs, but at the same time strengthening economic competitiveness? How can Systemic Design approaches in post-industrial areas can foster CE frameworks to address the current environmental and economic challenges of society?

This paper aims to delve into a better comprehension on Post-industrial areas on the lens of the Systemic Design as an expertise to identify CE strategies which are economically self-sustaining. In order to foster resilient livelihoods for the economic, ecological and social regeneration of deprived urban areas result of deindustrialization processes. To exemplify this, it is intended to examine the case study of the post-industrial area of Mirafiori sud in Turin, Italy.

## 2. Systemic design approaching the city as Living ecosystem

Nowadays there is higher complexity of social, economic and environmental challenges as they are ever more interconnected, it is required an innovative approach in order to find systemic and interconnected solutions (Brown and Wyatt, 2015). On such a scenario emerges the Systemic Design (SD), which intends to approach problems on a systemic and complex level. This expertise combines human-centered design inside complex, multi-stakeholder systems. Furthermore, the SD merges the designer skills such as research, reasoning methods and visualization practices generating new reconfigurations for complex services and systems (Jones, 2014).

On that view, the Department of Architecture and Design of Politecnico di Torino developed the SD approach that reconfigures the flows of material and energy from one component of the system to another, modifying outputs of one process into input for another one, in order to obtain zero emissions (Bistagnino, 2011). This methodology promotes new relations among the entities of a territory, enabling the visualization of hidden assets which will support a proactive synergy among local actors. Reactivating all source of territorial resources anticipating local development and

enhancing locally-based value chains (Barbero,2012). The creation of such a relationship network promotes a general wellness improvement in the community, activating a cash flow between the various system participants. (Bistagnino,2011).

In order to deliver efficient urban transitions, it's needed new anticipatory approaches on sustainable development from a holistic and systemic point of view that create cohesive and smooth transition (Barbero, 2017). In the case of sociotechnical systems and urban environment relations from an SD approach, it allows capturing and interpreting the complete complexity of urban systems (Grimm et al. 2000). The overall identification of these relationships and interactions among the different parts allows visualizing solutions that combine the potentialities and criticalities of such living systems (Newman and Jennings 2008). Delivering a proactive collaboration between local actors and simultaneously creating innovative decision-making strategies. In order to accomplish this, the SD approach proposes the Holistic Diagnosis (HD) tool which hands design approaches on strategies, services, and governance that can enhance the complex urban scenario while fostering social cohesion and flourishing local economies.

### 3. Systemic approaches for a Circular City

In order to tackle climate change and its economic impact, cities should be regarded as complex, dynamic ecosystems or living metabolisms through which resources flow between actors, across multiple scales and sectors (Williams, 2019). On that regard, there is continuous support at the frontline of the cities agendas for a paradigm shift on resource management from the conventional linear to CE. As the aim of the CE is to regenerate the economy meaning to “keep products, components, and materials at their highest utility and value at all times, distinguishing between technical and biological cycles” (EMF, 2013). This circular approach could serve cities to address the way they produce and consume resources, but also it could decrease waste, greenhouse gas emissions, underutilization of resources and the decline of urban ecosystem services. (Williams, 2019).

So, to empower urban transitions in those scenarios it is required design approaches on innovative strategies, services, and governance that can activate local resources while promoting social cohesion and flourishing local economies (Nevens, F, et al., 2013). However, given the complexity of the current environmental and economic challenges on the urban environment, the systemic approach can be an efficient way to interpret and give solutions. The SD is understood as one of the most effective expertise on enhance future CE strategies and to find innovative anticipative paths for urban transformation, economic restoration, and social cohesion. Achieving an effective CE vision which generates a wide range of services fostering local resources and therefore urban transitions (EMF, 2017). Such CE strategies are synthesized by the EMF on the ReSOLVE framework on six business actions: Regenerate, Share, Optimize, Loop, Virtualize and Exchange. Furthermore, translated by Prendeville et al., 2018 on a conceptual framework of a Circular City which delivers an overview from which to understand the ways CE could demonstrate in an urban environment (Figure 1).

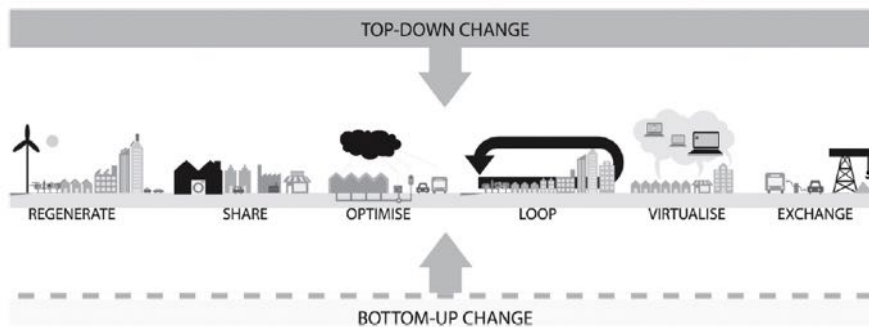


Figure 1. The circular city framework, adapted from the ReSOLVE framework (EMF, 2015). Taken from (Prendeville et al., 2018)

Based on the previous, to enable an effective approach towards Circular City framework (CCF), the SD approach through a Holistic Diagnosis (HD) tool delivers an anticipatory instrument for territorial development, that delivers new starting point for system mapping (Battistoni, Giraldo Nohra, 2017). Enabling an overview of such complex urban scenarios, in order to trigger a new economic model that arises from the appraisal of the resources offered by on post-industrial cities. Through a transdisciplinary approach, it invites actors from different sectors such as governments, civil society, and industry to co-create CCF strategies undertaking bottom-up and top-down. Allowing all local stakeholders to pull different economic activities that coexist to deliver social and economic welfare, which are the impacts of the CE fostering urban transitions. On the quest of flourishing resilience in cities, how can territorial thinking in post-industrial areas foster CCF to address the current environmental and economic challenges of society?

## 4. Holistic Diagnosis Tool for post-industrial areas

To deliver an effective interpretation of this complex scenario the SD describes the HD as a mapping tool in order to design a system (Bistagnino, 2011). The HD approaches a complete overview of the system context/product/process/service defining an exhausting study on behavioral patterns and interactions (Battistoni & Giraldo, 2017). This analysis combines both field and desk research to deliver a visualization of qualitative and quantitative data of the system components, also considering both the surrounding context and the flow of energy and matter. Consequently, the complex data collected in HD highlights the problems and leverages for change to enable the delivery of eco-guidelines for the new complex system and making the outcomes become accessible to a wider public and do not only serve the experts (Barbero, 2016).

This paper aims to delve into a better comprehension on the SD tool HD to identify CE strategies which are economically self-sustaining and which supply flourishing livelihoods for the economic, ecological and social regeneration of deprived urban areas result of deindustrialization processes. To exemplify this, it is intended to examine the case study of the post-industrial area of Mirafiori sud in Turin, Italy. Focusing on the outcomes of HD study approached in the area which was tailored to the

characteristics of the precinct to deliver systemic approaches for urban transitions within CCF strategies that can be cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. This holistic overview, it is aimed to foster urban resilience by delivering innovative strategies addressing new economies shared between public authorities, civil societies, and industry/SMEs.

The HD is characterized by 2 main steps of analysis which can be customized to scales/scenarios offering the possibility of adding different elements to create an outline for each context. The HD addressing post-industrial areas will be composed of the following steps:

1. Analysis of the urban framework: The first phase starts with an analysis of the urban context.
2. Top-down and Bottom-up analysis: From current policies to grassroots activities (NGO, entrepreneurs, ...) regarding axes related to CE and SD.

## 5. Mirafiori Sud District Through the Lens of Holistic Diagnosis

The Mirafiori Sud Precinct with 34.000 inhabitants is situated in Turin capital of the Piedmont region (North-West Italy)(Figure 2). Historically this precinct allowed Turin to be known as the 'automobile city'. As a matter of fact, Mirafiori is embedded along FIAT's history, after 1939 its fate has also transformed the area into the workers' district par excellence. However, the breakthrough point came after World War II, when the city population arrived at one million inhabitants, triggering Mirafiori to an exponential growth going from 3,000 artisans and farmers to over 50,000, mostly workers at the FIAT factory. This accelerated process brought fast urbanization of the precinct, predominantly with social housing infrastructure. At the same time, the social welfare services of the area make evident the strong connection between capital and labour of mass industrial production (De Filippi & Vassallo, 2016). Later on, the decline of the automotive production in the '80s carry the crisis that initiated the slow agony of the FIAT as a city-factory era. As consequence, came to a progressive abandonment process with the impoverishment of residential buildings and the depletion of commercial activities (De Filippi & Vassallo, 2016). The end of an era for Mirafiori precinct meant that without FIAT, it became a most evident space of social segregation.



Figure 2. City of Turin Map, On the dark area is Located the Mirafiori Sud District. (Author: City of Turin, 2018)

## 5.1 Territorial Thinking ; Step 1 Holistic Diagnosis

To achieve a complete overview of the Mirafiori precinct, this first part of the HD analysis approaches territorial framework from different points of view: from the urban fabric to demography, culture, and economy. The entire process is led by designers so in that view is important to emphasize the constant advisory from multidisciplinary specialists in order to certify their right interpretation (Barbero, 2017). The obtained data, in this case, comes from qualitative and quantitative databases:

Database	Entity
Census of the ISTAT (2011)	Statistical office of the Piedmont Region
Urban land registry (GIS) (2008)	Municipality of Turin
Geo-referenced data (2017)	Geoportal of the Municipality of Turin
Territorial Agency for the Home (2017)	ATC Office /Social Housing
Business Directory (2015)	Piedmont Region - Sustainable Development and Qualification Sector of the production system of the territory
Real estate values (2018) OICT	Real Estate Observatory of the City of Turin
School Observatory (2017)	City of Turin / Educational Services Department



CO-City Projects (2017)	Mirafiori Foundation
Projects AxTO (2017)	Municipality of Turin
Local projects (2018)	Mirafiori Foundation
Social Assistance Municipality of Turin	Mirafiori South Social Service
Population	Statistical office Municipality of Turin
Environmental Data Report	ARPA - Piedmont regional Environmental Agency

Table 1. Resource database for Holistic Diagnosis

Thus, to channel the amount of information towards the scope of the research (CE strategies), this data collection was represented within maps of the precinct to have a better understanding of the spatial dynamics before the new reinterpretation of the system. Below there is the analysis of each of the selected categories for post-industrial area:

### **a) Urban Fabric**

This category was focused on morphological features and natural resources having special attention on existing infrastructure, urban voids and public services (with a focus on quantity) (Figure 3). Considered a periurban area with a total surface of 11,491 km<sup>2</sup> A the aspect of the district and morphology of the neighborhood design around the FIAT. The Mirafiori precinct is surrounded by a considerable belt of green areas (i.e Corona Verde). Moreover, the fact that its borders are delimited by the Sangone river has given the district a network of naturalistic pathways. There is a considerable extension of public greenery with like Parco Colonnetti and Piemonte. The urban biodiversity and local ecosystem are connected by greenery present on the most important mobility corridors such as Corso Agnelli, Settembrini, Unione Sovietica or via Plava.

From the morphology of its public spaces, it can be divided the distribution of the district originally planned as Garden city (De Filippi & Vassallo, 2016) the accessibility to public recreational spaces is limited as they are concentrated in one side of the precinct. In fact, this resembles on the mobility components which give priority to the private vehicle use area (significant extensions of FIAT Parking area), there is a lack of public transport connectivity and scarce cycling infrastructure within the precinct. The analysis of the built environment enables to see the vast extension of the land occupied by FIAT and the urban voids part of the ex-industrial areas revealing the challenges and disconnection between the services of the district and the rise of brownfields and polluted areas. Moreover, it also reveals the considerable amount of social housing which subsequently expanded and finally downsized.

Nowadays only 30% of the total industrial complex of FIAT is in operations, identifying the deployed and active areas. As a result, many of the social welfare infrastructures such as schools, universities, markets, libraries, and social housing quality average have been shutdown or abandon.

On regards, public service is a well-served area, what rises the attention is the presence of the incinerator on the precinct, which not only arises considerably the emission of the neighbourhood but also there is very little awareness on regards wastes management on the precinct due to its dominant role. Concerning food security, even though this precinct is peri-urban area with huge potential there is no local supply of products. Over the years there has been initiatives to promote km 0 as Mirafiori Social Green VOV102 and local markets these ones have constantly failed because of price and supply, making local residents to do groceries on the few supermarkets of the area or other neighbourhoods.

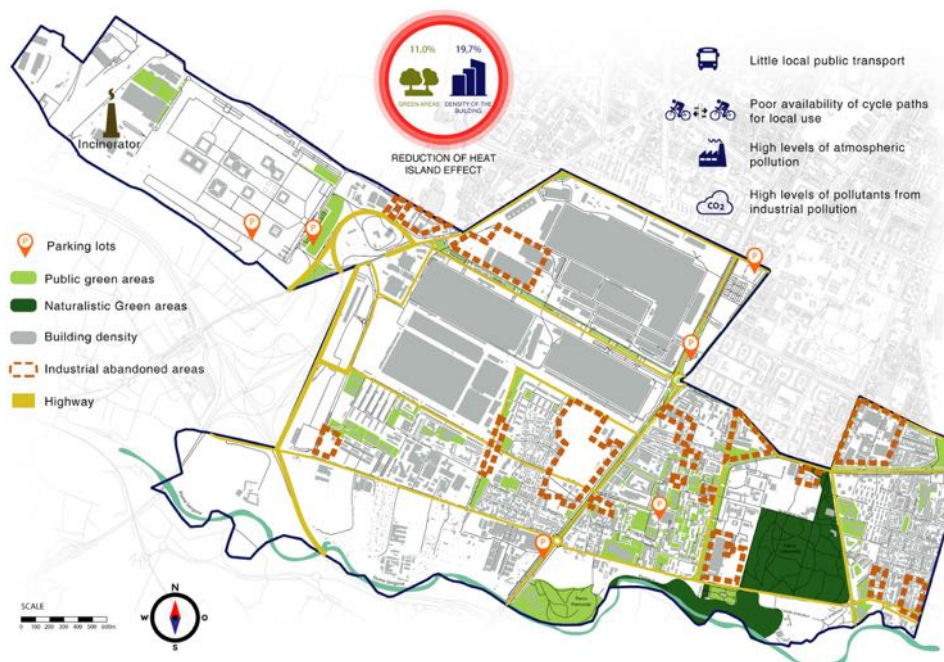


Figure 3. Mirafiori Urban Fabric map, Holistic Diagnosis. (Author: M .Di Giovanni , E. Ferruli, C. Giraldo Nohra, 2018)

## b) Demography

This category focus in Mirafiori as workers' precinct par excellence. Specifically focused radical changes in their demographics from high levels migration in the 1950s from southern Italy to the

diaspora crisis of FIAT in the 80s the transformation of the social fabric over the years (Figure 4). The district presents the characteristics of an enclave: a concentration of people with a high incidence of social problems and a strong cultural mix, physically isolated and socially separated from the surrounding areas. At the same time, this condition gave a strong sense of belonging to the inhabitants of the area character that still tries to survive in the third sector associations.

From the sociotechnical perspective, the analysis delivered radiography of the post-industrial society of Mirafiori. This phenomenon has reflected on a decline of the population density in the on almost 50% since 1970. Consequently, this has reflected on the high rates of adult and elderly which represent 60 % of the total population. In fact, the high rates of unemployment on the area also have an influence on the diaspora of young people and the scarce settling of new families into the precinct. Additionally, the population of young people with low education or at risk of school dropout, neighbourhoods in conditions of environmental degradation and high risk of exclusion and poverty.

Even though the presence of FIAT is still significant as an employer of the area, the types of jobs were forced to diversify on the decline of the automobile sector with single man enterprises. Another key actor on the territory as leverage for change is the Politecnico di Torino (Mirafiori campus) and University of Turin (chemistry faculty) which have brought a considerable student community along with universitarian residences that aim to change the social and economic dynamics of the area.



Figure 4. Mirafiori Demography map, Holistic Diagnosis. (Author: M .Di Giovanni , E. Ferruli, C. Giraldo Nohra, 2018)

### c) Economy

The economic indicators are evidence of how the precinct has transitioned from a Fordist economic model and to the poor of economic diversification since FIAT left as a main economic actor this is reflected with low speared entrepreneurial activity and infrastructure property value (Figure 5). This revealed the numerous urban voids on the area show a progressive depletion industrial and residential buildings and the reduced commercial activities.

Moreover, is important to highlight the increasing role of the third sector as a potential force of economic reactivation. The Mirafiori's thirds sector gathers over 30 public and private partnerships to help improve the precinct from an environmental and social point of view, support the processes of transformation initiated, increase the equality of access to the opportunities of its inhabitants, preferring intervention modalities that involve actively recipients.

From multinationals to entrepreneurial activity to oversee what other sectors have emerged in the district beyond FIAT. The companies based in Mirafiori Sud they employ a total of more than 139,000 employees divided into two categories: employees family members and subordinate employees. The first is a total of just over 2,000 while subordinate employees reach 137,000.

Sectors of Family Business	Sectors of Subordinate Business
<ul style="list-style-type: none"> <li>● Retail sale of other non-food products</li> <li>● Construction Sector</li> <li>● Wholesale of audio video recorded media</li> <li>● Restaurants</li> <li>● Mechanical repairs of motor vehicles</li> <li>● Real estate</li> <li>● Manufacture of metal structures</li> </ul>	<ul style="list-style-type: none"> <li>● Manufacture accessories for motor vehicles and engines</li> <li>● Transport</li> <li>● Manufacture of machinery and equipment</li> <li>● Manufacture of spacecraft aircraft and related devices</li> <li>● Incinerator- waste management</li> </ul>

Moreover, is important to highlight the increasing role of the third sector as a potential force of economic reactivation. These activities have been promoted by a strong presence of the Third sector actors which are gathered under Fondazione Mirafiori management. On regards the economic reactivation the presence of TNE (Torino Nuova Economia) is relevant as an intervention company with predominantly public capital, established to implement these former disused industrial areas become fertile ground for the creation of new urban redevelopment opportunities through the reindustrialization and establishment of service activities. The analysis aims to focus on shifts then to areas of innovation, from a CCF point of view for Mirafiori precinct.

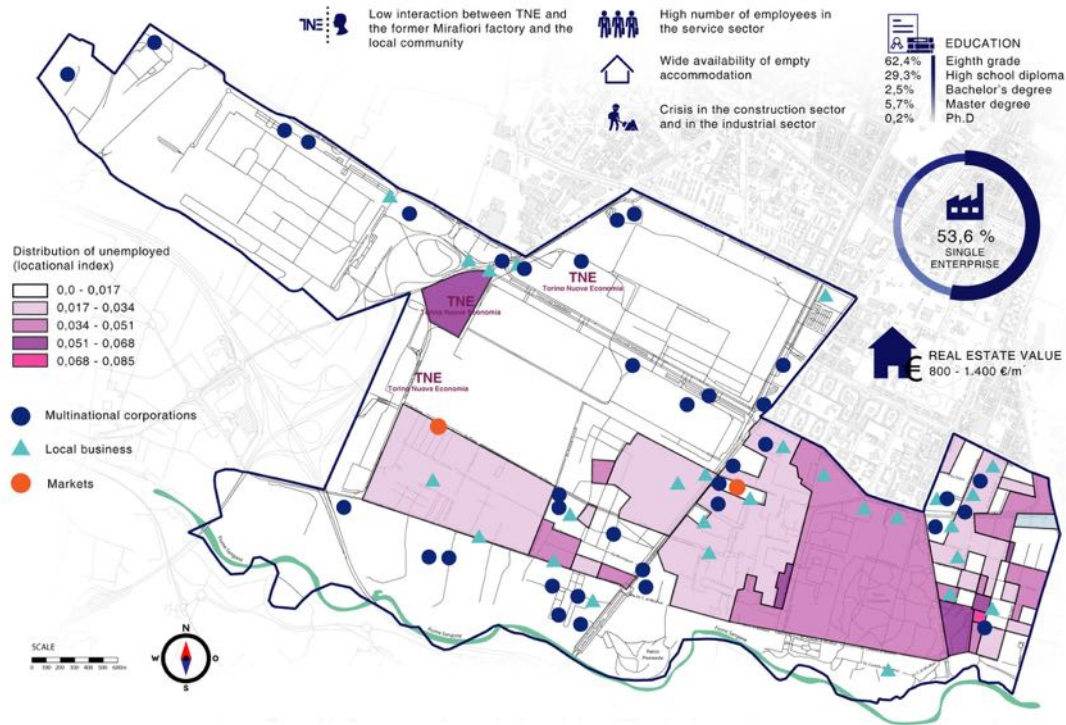


Figure 5. Mirafiori Economy map, Holistic Diagnosis. (Author: M .Di Giovanni , E. Ferruli, C. Giraldo Nohra, 2018)

### c) Cultural

Given the historical background of this precinct shall be approached as Post-industrial Cultural heritage site (Figure 6). As the history of the area is embed with FIAT on every cultural aspect showing the influence of the company on who has resided in the area and how it has shaped all aspects from the urban fabric to demographic and economic. The current cultural agenda has been promoted by a strong influence of the Third sector actors over 30 organizations working on the precinct. These organizations are promoting the conservation of the cultural heritage and new urban identities to arouse on one side reflection and sense of belonging by the inhabitants; on the other hand, interest, and attraction for the territory by the city of Turin and beyond the municipal boundaries; implement inclusive and participatory cultural initiatives. As historical working class precinct, the sense of belonging has been a constant over the years making a very active community despite the current challenges of depopulation and increasing aging bring much influence from south Italy's influence.

On regards the architecture heritage since the '90s, different urban regeneration projects were promoted to preserve and enhance the urban fabric and Post-industrial Cultural heritage sites, to

give a new image to the district. Nevertheless, despite the huge amount of resources and expertise, they have always reached rather modest outcomes. A focus on the industrial dismissed areas of FIAT and other historical sites related to the principal landmarks and their location.

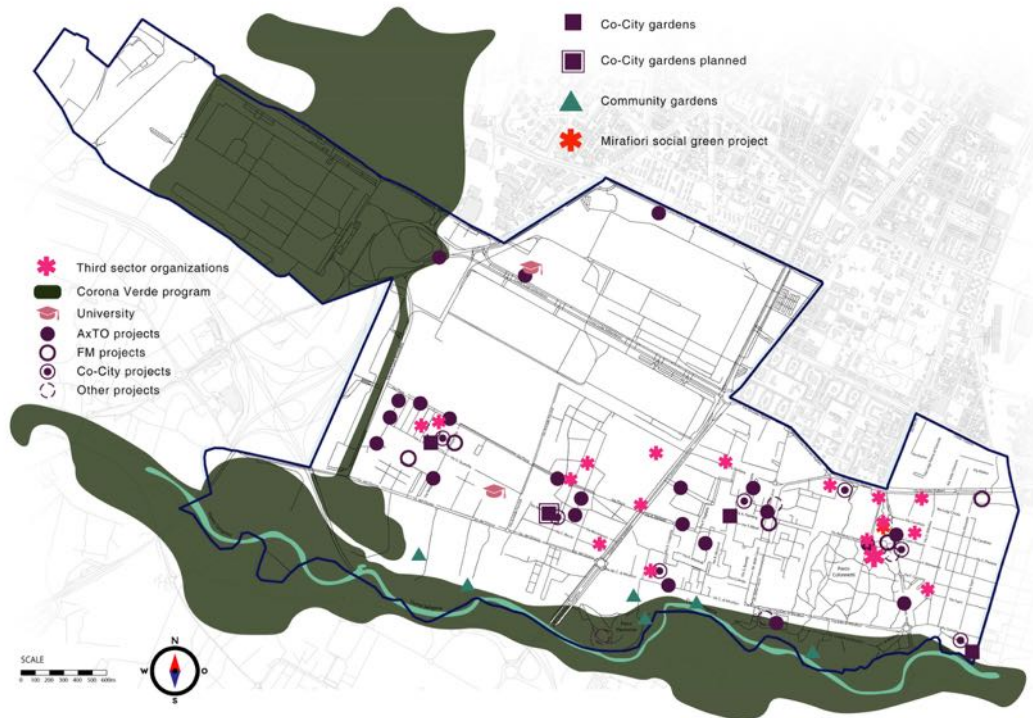


Figure 6. Mirafiori Culture map, Holistic Diagnosis. (Author: M .Di Giovanni , E. Ferruli, C. Giraldo Nohra, 2018)

## 5.2 A Top-down and Bottom-up approach; Holistic Diagnosis 2nd step

On the HD1 it was aimed to render the aspects on the potentialities and challenges of Mirafiori precinct, in this case through maps that highlighted the adjacency of such factors. From that point of view, the second phase of the HD approaches the area from a Top-down and Bottom-up perspective (Barbero, 2017). In this case, creating a panorama from current policies to grassroots actions regarding axes related to CE and SD. Furthermore, this phase aims at describing their main features and priorities but at the same highlight the potentialities and criticalities from an SD and CE perspective. On this view the analysis was divided into two:

Top-Down: A panorama of the current policies that in execution in the Mirafiori precinct.

- Torino Metropoli 2025,
- AxTo - Action for the suburbs of Turin,

- Metropolitan Strategic Plan 2018-2020,
- Urban program 2001.

These instruments address regeneration as a multidimensional concept containing economic development, employment opportunities, services effectiveness, cultural and social regeneration, inclusion. This action has to do with the economic dimension of sustainability. It aims to reach opportunities offered by innovation through more efficient use of resources creating socio-economic value with minimum impact on natural systems. In particular, the Mirafiori precinct since the begging of its decline in the '90s the city government has stimulated a series of policies for urban regeneration, entrepreneurship, and social cohesion. Promoting coordinated actions on the efficiency of use of natural resources, but also landscape restoring and rehabilitation and sustainable economic models. Nevertheless, these traditional regeneration instruments require to coordinate new forms of social inclusion of the community and stakeholders as the CCF to activate public and private resources.

Bottom-up: A panorama of the organizations that are leading current grassroots actions on Mirafiori precinct delivering a state-of-the-art on the potentialities and challenges of local stakeholder interactions. These are the key players along the local community in such actions:

- Fondazione Mirafiori
- Progetto Casa Artemisia
- Cooperativa Sociale Mirafiori
- Centro Mirafleming

These are the most relevant of an entire network of 30 entities of the third sector present in the precinct. Whose activities have built a more effective citizen-public administration relationships. Promoting local development through actions on social innovation, entrepreneurship, health, food security, and cultural heritage. Their interaction with citizens intends to act as a catalyst for initiatives that arise from the territories and facilitate the synergies of interventions - emerging, ongoing and future - that provide for the active participation of citizens in the co-design and implementation of interventions for the redevelopment and regeneration of collective spaces. Also in a perspective of co-planning and co-production of services and management of collective assets which facilitates the involvement and active participation of citizens, encouraging the inclusion of all the groups of communities involved in the process, with attention to the weaker groups. Last but not least, FIAT continues to be one important player to bring regeneration on the area as they aimed to provide a strong CSR component that shows the commitment of the company to enrich the Post-industrial Cultural heritage site.

These actions deliver a state-of-the-art highlighting the major strengths and weaknesses. Moreover, identifying the relationships generated by these local and government actions as a key asset. This combined vision of bottom-up and top-down actions delivers a complimentary on how the SD should stimulate local assets towards urban resilience and foster CE. The overlapping of HD1 and HD2

features how some components from the HD of the precinct are not taken into account from the Top-Down and Bottom-up actions, accede an accurate approach to the gaps towards a CE.

## 6. Conclusions

The previous illustrates how the HD territorial thinking on complex phenomena scenarios can be an efficient way to interpret paving a way for innovative solutions. On that view, the SD approach is poised to be an instrument which benefits all stakeholders leading them to paths where all can reach an effective sustainable development creating new scenarios of economic profit and cooperation (Barbero, 2017). The presented HD outcomes broaden the first approach of Mirafiori precinct on the lens of CCF at multiple levels such as : (a) On the technical level based on the components of the urban metabolism networks through which will result in the creation or redesign of local, circular supply chains, (b) On the social level enabling citizen-based ownership of local resources on post-industrial areas through co-designing, co-creating, and co-implementing of new protocols for the integration of CE strategies, (c) On the economic level through systemic approaches boosting circular business models for products and services, the output will be a framework with strategies for post-industrial areas highlighting market opportunities and public-private partnership models for circular productive activities, (d) At Policymaking level these results will aim to change local policies on post-industrial areas and, fostering a better governance and disseminate innovative solutions towards a CE addressing current funding programs.

In order overcome the systemic effects of de-industrialization and reactivate economic growth, post-industrial cities have had to reactivate their urban fabric through circular strategies, fostering a transition into a productive and stimulating place to live and work in that would restore residents' sense of belonging and attract investment. This holistic urban regeneration in a CCF lens is gaining traction in an effort to improve the social, economic and physical environment. Eventually, this holistic approaches on post-industrial precincts such as Mirafiori shall foster urban transitions and evolve the current planning and policy environment, as a result, the design and implementation of city development strategies on CE. On that context, this expertise pretends to turn into a role model methodology for cities with industrial legacy. Fostering local actors towards sustainable development and better governance, disseminating innovative solutions to reinvent and shape more cohesive post-industrial cities.

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