

Post Expo Planning: A Science and Technology Park to Feed the Planet

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Abstract

Discussions regarding the future of the Milan World's Fair site had already begun even before the conclusion of Expo 2015.

Today, major events are recognized catalysts for urban transformation and represent opportunities for city administrations to promote regeneration and development by delivering a range of results for the host city and nation. Planning for the reuse of a world exposition site must outline an efficient strategy that can leverage the quality of its regional context and create new urban development.

This paper outlines a proposal that serves as an instrument that would regulate development and, at the same time, enhance local resources and potential. The goal is to demonstrate that smart and sensitive planning can lead to ambitious results, like large-scale public works, reducing time and limiting the waste of resources. An urban development program must not only plan a physical context but must also drive a region's and community's economy.

1. Introduction

City governments have always considered big events (Olympic Games, world championships, world's fairs) as valuable opportunities to promote regeneration and development (Smith, 2012). The role of the Olympic Games as a catalyst for urban change and development is now well recognized (Andranovich et al., 2001; Gold & Gold, 2008). The Rome Olympics in 1960 heralded, for the first time, the role of the Games in stimulating major infrastructural development, a role which was later accentuated particularly by the financial profits generated by the Los Angeles Games in 1984 and, more importantly, the urban transformations achieved by Barcelona in 1992. A similar trajectory, although on a more modest scale, is also evident for the Winter Olympics (Chalkley and Essex, 1999; Essex and Chalkley, 2004): the Winter Olympics in Turin in 2006, for example, were notable for transforming a large industrial city as well as acting as a tool of wider regional integration.

Universal Expositions, which have often been indicators of the political, economic and social status of entire nations, are no exception to this rule (Pozzi, 2015). In an Universal Exposition, technology, science, architecture and arts are joined under the umbrella of an overriding theme, uniting host city and participating nations. All activities take place within a physical space that seeks to bridge the international community's past, present and future. For this reason, the public space of a world's fair is a new and truly important dimension and offers great opportunities in light of the resources provided by and to the host city and nation. It is important to discuss the destiny of these sites and the resources that they can potentially represent for a host city (Garcia, 2004; Lopez Martin, 2012; Ferdinand & Kitchin, 2012).

A world's fair legacy can be expressed as a:

- *Physical legacy:* the buildings and infrastructure that remain;
- *Social legacy:* the way events change citizens' lifestyles and the host city's new image on the international stage;
- *Content legacy:* the discussions activated during the exposition that offer important ideas for the future.

A plan for the reuse of a world's fair site must consider these aspects in order to outline an efficient strategy that can make the most of the regional context and create a new pole for urban development. In such cases, a feasibility study is necessary, but such a study is not enough to ensure the success of a project on this scale.

Today, the key word in architecture is “sustainability.” This catchphrase means a variety of different things but unfortunately many people still associate it with ecology and technology. Not only must building components be “sustainable” but so must the very concept of a physical object which has strong bonds with the landscape, local construction materials, morphology, the community and, above all, the market. The construction and management of a work of architecture, be it a single structure or a neighborhood, depend on the availability of financial resources and so, stated synthetically, are determined by financial sustainability (Dell'Acqua et al., 2013).

From that standpoint, the importance of preliminary analysis – identifying potential investors, both public and private, and benefits for local communities as well as highlighting the interests at stake – cannot be underestimated.

Despite the fact that the Milan World's Fair, Expo 2015, is over, its site is still strategic for the entire Northern Italy mega-city region. Post-event planning offers an opportunity to provide Milan with a high quality public space that can also

respond to local needs. In accordance with the Expo theme, food and nutrition, post-event strategy should promote local resources (such as landscape and environment alongside cultural, social and economic activities) in order to merge competitive and sustainable goals and integrate global and local approaches in an innovative model of “glocal” development on the macro-regional scale (Di Vita, 2012).

This paper outlines a proposal that serves as an instrument that would regulate development and enhance local resources and potential at the same time. The proposal was conducted in two phases. The first dedicated to territorial analysis and the identification of spatial indicators, the results of which informed the design of the urban project during the second phase. Finally, we considered the project’s economic and financial implications.

The proposal’s main goal is to demonstrate that through smart and sensitive planning, large-scale efficient public works can be realized while reducing the use and waste of public resources. Therefore, the urban development plan is not only a tool for spatial design but is also a means for economic, financial and social management.

2. From analysis to design: the proposal for the future of the Expo site

Urban development is tied to smart planning policy and efficient strategies based on social, economic and ecological sustainability. Here, we present an application of this approach. From the determination of the new uses for the site to design strategies, nothing is casual or arbitrary. Decisions made during the planning process are the results of a careful analysis of the urban/regional contest (Colombini & Di Gregorio, 2012). The design goals grew from territorial analysis and the study of the planning regulations in effect and as such, were considered not only the synthesis of the preliminary phase, but also a point of departure for the thinking and propositions that will be described here.

The project goals were determined to be the following:

- recover as many buildings and as much infrastructure as possible. On the one hand they are Expo’s physical legacies and so will always remind people of the events that transpired on that site. On the other, they are strategic resources for the area’s development;
- ensure the physical and psychological comfort of the population and of visitors by increasing green space, including the development of a vast public park;
- open the area to the city and avoid its deterioration and abandonment by building public works and providing attractions such as the aforementioned park, as well as museums, theaters and sport facilities;

- minimize the emission of pollutants by opening the area to the transit of electric vehicles only;
- increase slow mobility (by foot or bicycle) by creating more bike sharing stations connected to the ATM service already present in the center in order to reinforce bonds with the city’s more utilized areas;
- develop the area by creating a center on the leading edge of food technologies that acts as an accelerator of local economic development, as well as a place for innovation and incubation of businesses with strong connections to the international markets.

2.1. Preliminary analysis: Expo and reshaping Milan

With its title *Feeding the Planet, Energy for Life*, the Milan Expo sought answers to questions like “How can we ensure healthy eating habits for everyone? How are food and health related to lifestyle, physical activities and to comfort in general? How does the demand for food affect decisions in the fields of energy and natural resources?”

Despite its focus on the theme of human nutrition, there were discussions of related subjects such as the importance of “feeding” our habitat, the place our food is produced. Expo 2015 did not pretend to provide definitive answers to all these questions but the event did seek to trigger an international conversation and collaboration among the various participants.

Expo 2015 took place in Milan’s northwestern district. 85% of the site area is included within the city perimeter – Zona 8: Quartoggiaro, Gallarate, Fiera; the remaining 15% belongs to the city of Rho.

The site (figure 1) was conceived as an island surrounded by canals. Its design was simple and rational, defined by a rigid orthogonal grid structured along two main axes: the Cardo and the Decumano. The first, approximately 350 m length, runs in a N-S direction; along it are the various Italian pavilions representing the host country. The 1.5 km Decumano is the major E-W axis with the pavilions of the participating countries, as well as thematic “clusters,” services and food and beverage areas. At their intersection is Piazza Italia, where Italy symbolically meets the rest of the world.

This scheme was inevitably conditioned by understanding the characteristics of Milan’s complex urban system. Analogously, similar analysis was essential in designing an effective post-event proposal insofar as strong links with the regional system and knowledge of its social context are keys to the success of a project that seeks to integrate a vast and marginal area within Milan’s variegated urban system.

To facilitate territorial analysis, Milan’s environmental system was organized into a number of independent mutually interacting layers: infrastructure, green and water systems. Understanding the state of the infrastructure that provides

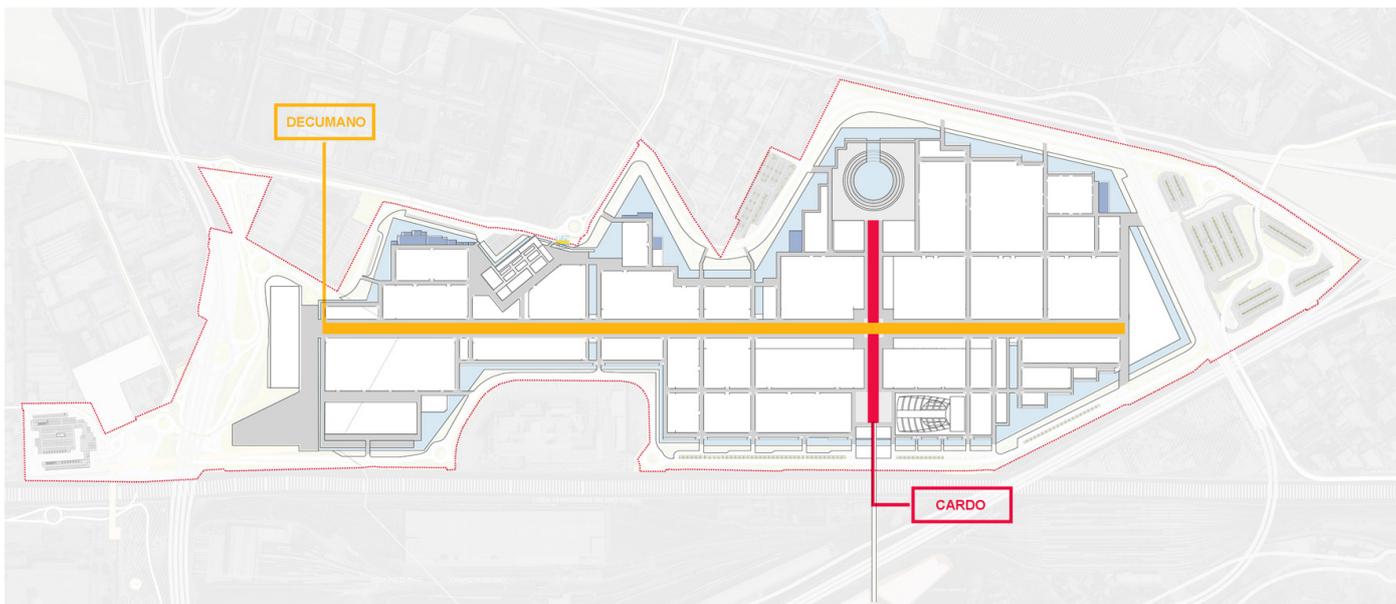


Figure 1 – Expo 2015 site plan.

mobility to and from a site – not only on the municipal level, but regionally and nationally as well – is vital for planning. In this case, regional accessibility is provided by the rich road system in northwest Milan, as well as the railways and the Linate, Malpensa and Orio al Serio airports. Direct access to the site (figure 2) is guaranteed by various transportation systems, both private and public. First, the road connections and highways: A8 Rho-Milano highway connecting the NW-SE axis, and connecting to the West Ring Road (A50); and the A4 Turin-Venice highway, that instead joins with the A51, the Eastern Milan Ring Road. The site is also well served by public transportation. The presence of transportation infrastructure is massive and conditions not only strategic access to

the site but also its morphology. The rail lines and highway spurs divide the different urban contexts and inevitably influence spatial use and perception.

Milan’s “green” system consists of an assortment of natural resources and parks located around the city’s perimeter and connects to such regional natural systems as the Lambro river that links Monza and its park, the Groane system that descends from Brianza, and the Grugnotorto Villorosi Park near the canal bearing the same name. Among the parks that make up the “green ring” that surrounds the city are the South Agricultural Park, notable both for its extent and its proximity to the city center, and the North Park. Furthermore, other smaller parks close to the city center are numer-

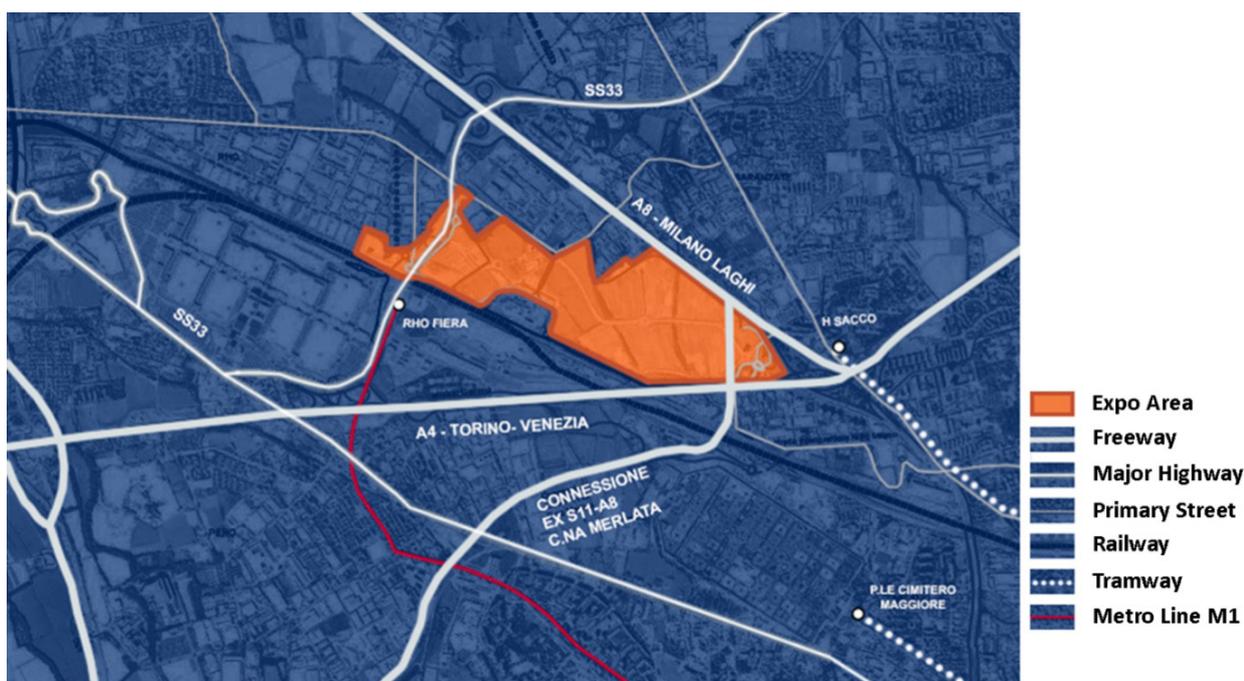


Figure 2 – Direct access to the site (source: adapted from Arexpo, 2014).

ous, distributed throughout the municipality. There was almost a complete absence of green space in the areas surrounding Expo 2015 (figure 3), with the exception of the South Agricultural Park and the new Cascina Merlata development. The presence of agricultural areas prevails but they are often uncultivated and not very well maintained. Unfortunately, intense urban expansion not only in Milan, but also in adjacent municipalities, has often sacrificed green space to real estate interests. The new regulatory documents, including the municipal urban plan (Comune di Milano - PGT, 2012) have sought to halt and reverse this trend by gearing planning towards respect for the environment and the landscape in order to ensure greater livability and health in the city. Milan is also a water city. In fact, even if there is not a large river, the city is built on the groundwater in the subsoil that sometimes emerges on the surface. The exploitation of this

tic and relentless urban renewal, both from the physical point of view as well as from the administrative one. The measures adopted in recent years, in particular the local urban plan (Comune di Milano - PGT, 2012), seek to reshape the city's image starting with its physical structure. Until the last century, urban development in Milan was concentric, growing from the center to the edges. Current trends point to the creation of a polycentric system in which distances between the center and the more marginalized neighborhoods can be reduced (Balducci & Artoni, 2005). The distribution of facilities and services throughout the city will be used to create a dynamic network of connections, to the detriment of the previous radial distribution, improving the standard of general services and the quality of life for all citizens (figure 4). The post-event proposal was designed following the indications contained in the PGT and other documents prepared

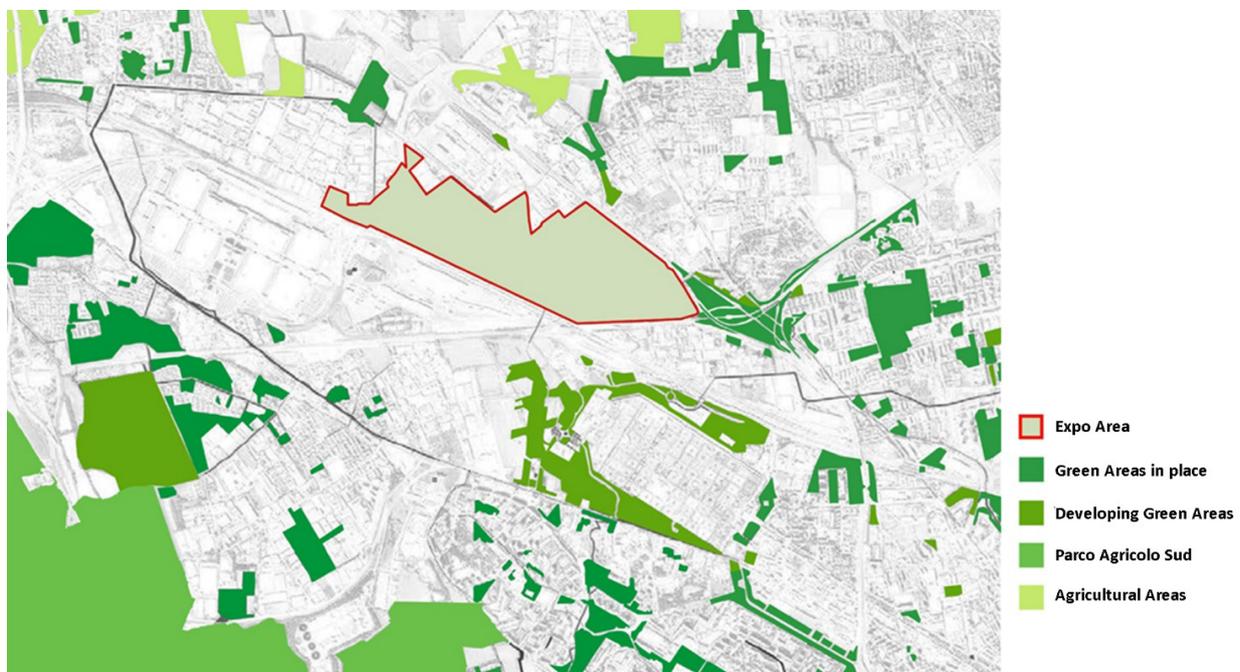


Figure 3 - Green areas (source: adapted from Arexpo, 2014).

resource over the centuries has contributed to the city's urban form. Finally, in proximity to the site are many noteworthy facilities including the Rho convention center and the Sacco Hospital, both having regional and national importance. For various reasons, both poles attract large flows of people throughout the year and are well served by public transportation, particularly rail. Moreover, it should not be overlooked that many of the important sites near the area are currently undergoing urban transformation in accordance with the various planning agreements in effect ("Fiera", "Sacco", "Merlata" program agreements - AdP). Thus we consider the entire area as a vast area of urban transformation. On the other hand, Milan itself is currently experiencing hec-

for managing the exposition site, in particular the 2010 proposal for a variance to the municipal plan, which identified the Expo area and regulated it, outlining a general framework for the post-Expo period, pinpointing the applicable planning parameters for the various project units and indicating potential uses. The goal was to provide Milan with a regenerated context perfectly integrated within its urban system, as a pole of attraction and focal point for future development of the surrounding context. The contents of the Expo 2015 program agreement (AdP) for the post-expo period can be summarized as follows:

- while not binding, it should be a priority to preserve the legacy of works and artifacts left by the event, through design solutions that seek to maintain and improve structures,

artifacts and existing facilities;

- in order to renew existing industrial areas, the establishment of a regional-scale functions should be preferred, excluding big-box shopping malls and heavy industry.

Moreover, in July 2014 the company that owns the land, Arexpo, issued a request for proposal (RFP) for an urban redevelopment program for the Expo 2015 site. While this document did not constitute a regulatory plan, it did contain

planning excellence in order to attract investment and create jobs while promoting social inclusion.

2.2. A science and technology park to feed the planet

As mentioned earlier, Expo 2015 was an opportunity to engage in discussions on the topic of food which was examined from many points of view: nutrition education, sustainability of agricultural production, development of new technologies

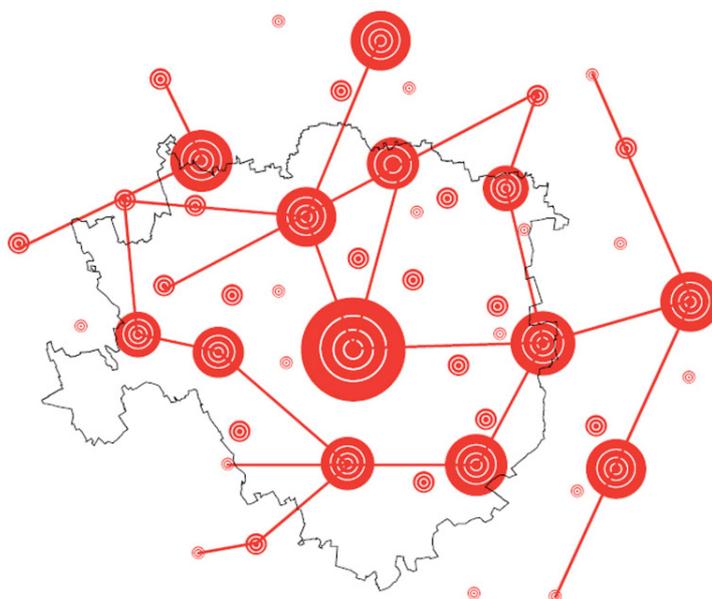
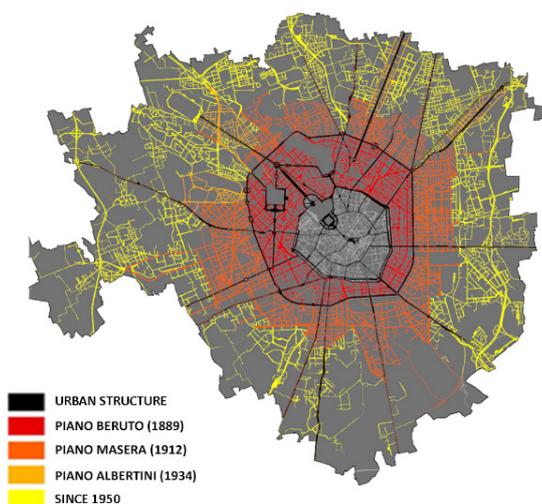


Figure 4 – Urban development of Milan (source: Comune di Milano - PGT, 2012).

useful guidelines for the site’s redesign .In accordance with the Expo 2015 AdP, the Arexpo masterplan oriented towards the reuse of the physical and intangible resources inherited from the event, thus optimizing both the time and resources required to redevelop the area.

The guidelines and the masterplan:

- suggest a so-called “Fast Track” to reopen the site as quickly as possible by using some of the facilities immediately after the end of Expo;
- locate a theme park, which will cover more than half of the site, in the site’s eastern area. Building volume will be concentrated in the western area because of easier public accessibility;
- identify the essential elements, from among the existing structures and infrastructure, upon which to base the design;
- organize the elements that make up the “ground slab” into various mutually dependent layers in order to facilitate analysis and the redesign of existing structures;
- define possible changes to the infrastructure system to improve access and the permeability of the area to individual transport and public mobility;
- pursue the highest quality in design and innovation and in

and, above all, the problem of world hunger. These discussions were the starting point for determining the site’s new use: a Science and Technology Park (STP) that can foster the development of technologies and strategies to fight world hunger.

STPs have become more widespread especially over the last two decades. They are conceived as places that promote innovation and technological development, as well as the improvement of local economies. Through concrete networks among the worlds of research, business and universities, STPs support the production of knowledge and the diffusion of innovation, accelerating technological development and enhancing the competitiveness of a region and its enterprises (APSTI, 2004-2008).

The relationships and collaborations established among the subjects hosted in a STP help develop local resources generating economic and technological externalities. This stimulates the interests of those outside the area to stipulate multilateral agreements among researchers, scientists and high-tech enterprises aimed at developing cooperative research activities and innovative internationalization projects. The proposed STP model calls not only for a center for technological innovation and knowledge creation but a place

where global interests in science, business and teaching can converge to develop large-scale international projects. In other words, the area would become a center for dialogue and cooperation between nations, perpetuating Expo aims and ideals which might otherwise be lost.

The project perimeter (figure 5) and the calculation of usable areas (table 1) were deduced from the existing planning documents regulating the site: "Expo 2015" AdP and Milan's ur-

Table 1 – Useable areas.

Planning parameters	
Land area	1,100,000 sqm
Land use ratio	0.52 sqm/sqm
Coverage ratio	60%
Gross usable area	480,000 sqm
Buildable area	220,000 sqm

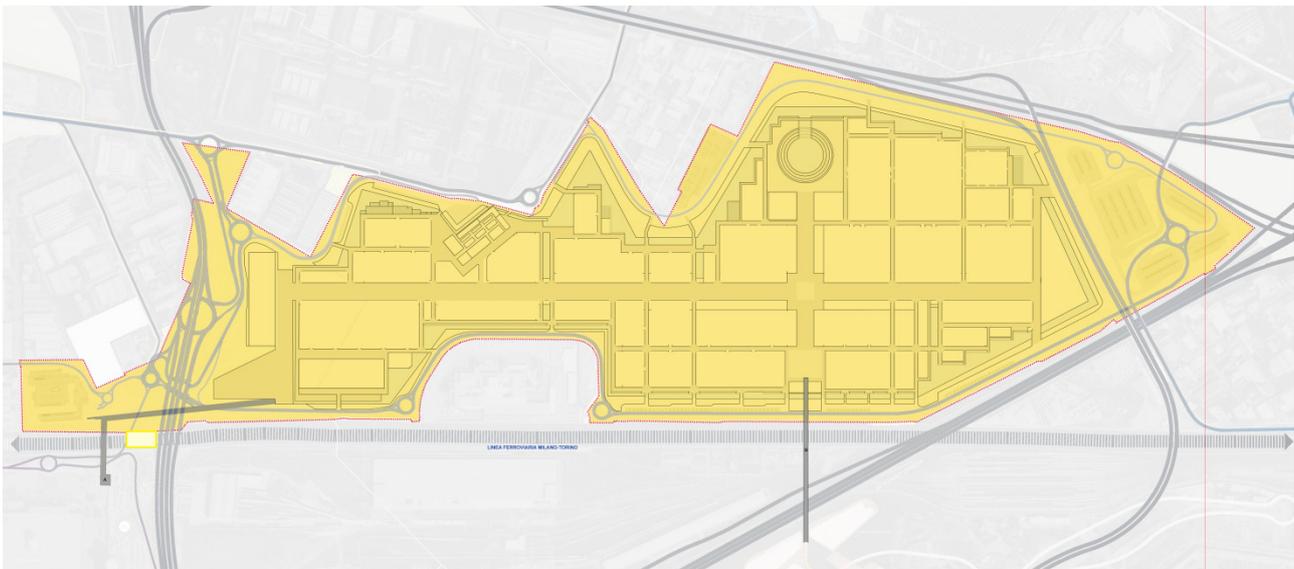


Figure 5 – Project area.

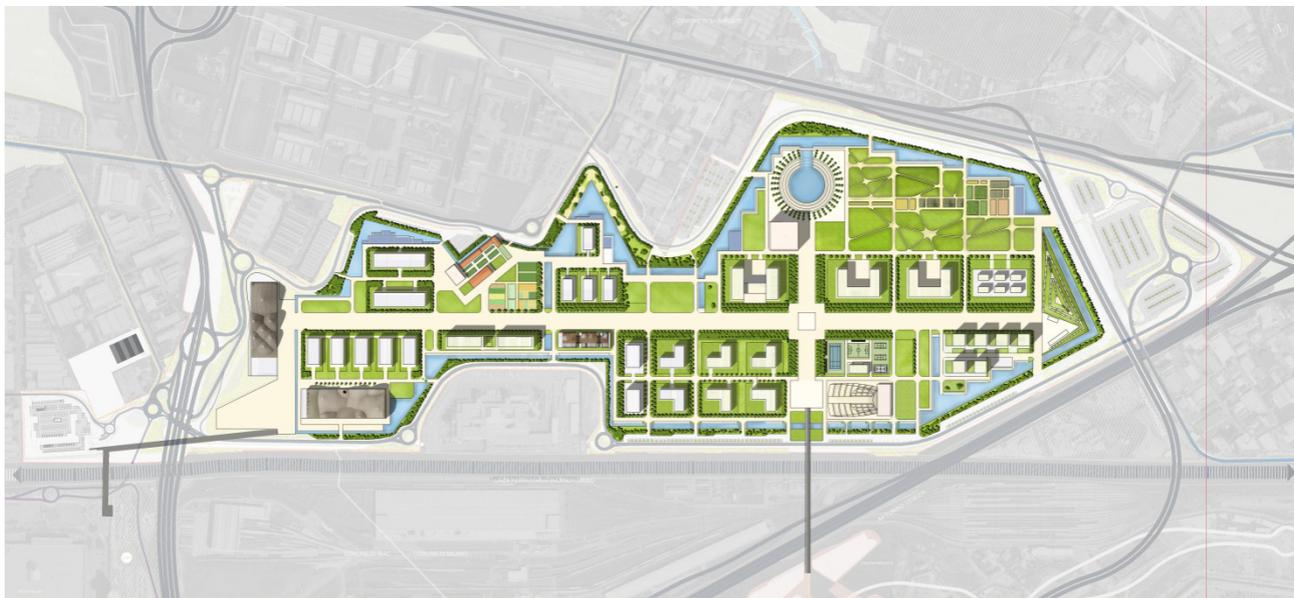


Figure 6 – The new site plan.

ban plan. The allocation of minimum services was defined by the planning standards mandated in Regional Law 12/2005. The new design (figure 6) took its cue from the idea of reusing and improving as many of the existing facilities and as much infrastructure as possible in order keep the memory of the past event alive while reducing construction time and costs.

In compliance with the planning parameters, the project seeks to create a high quality natural space. The goal is to reinforce the user's perception of visiting and working in a healthy and lively environment, which is often not the case in traditional STPs.

As mentioned, one of the project's goals is to recuperate existing facilities and infrastructure. This operative choice was

not motivated only by the indisputable advantages in terms of optimizing time and costs. With its orthogonal road network and innovative works of architecture, the Expo site is a distinguishing and iconic place within Milan's urban system.

“use fitness” of each of them through the study of the specific features of the structures themselves along with the organizational scheme drawn up in the STP study (figure 7). Among the structures designated for preservation are the Italian

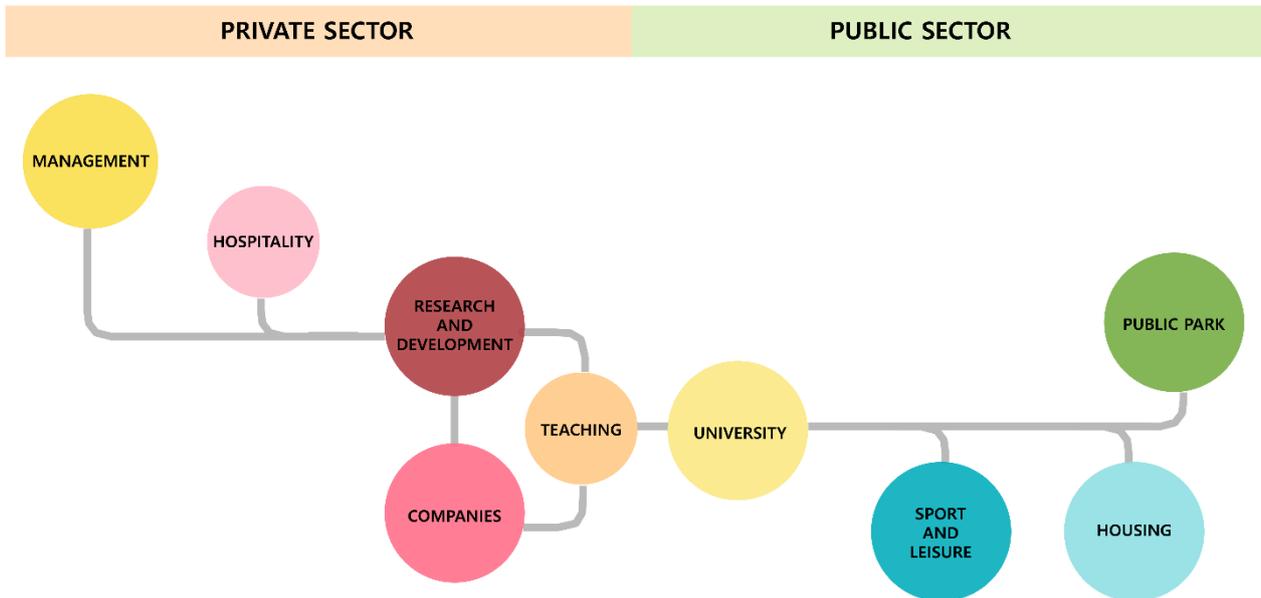


Figure 7 – Organizational scheme.

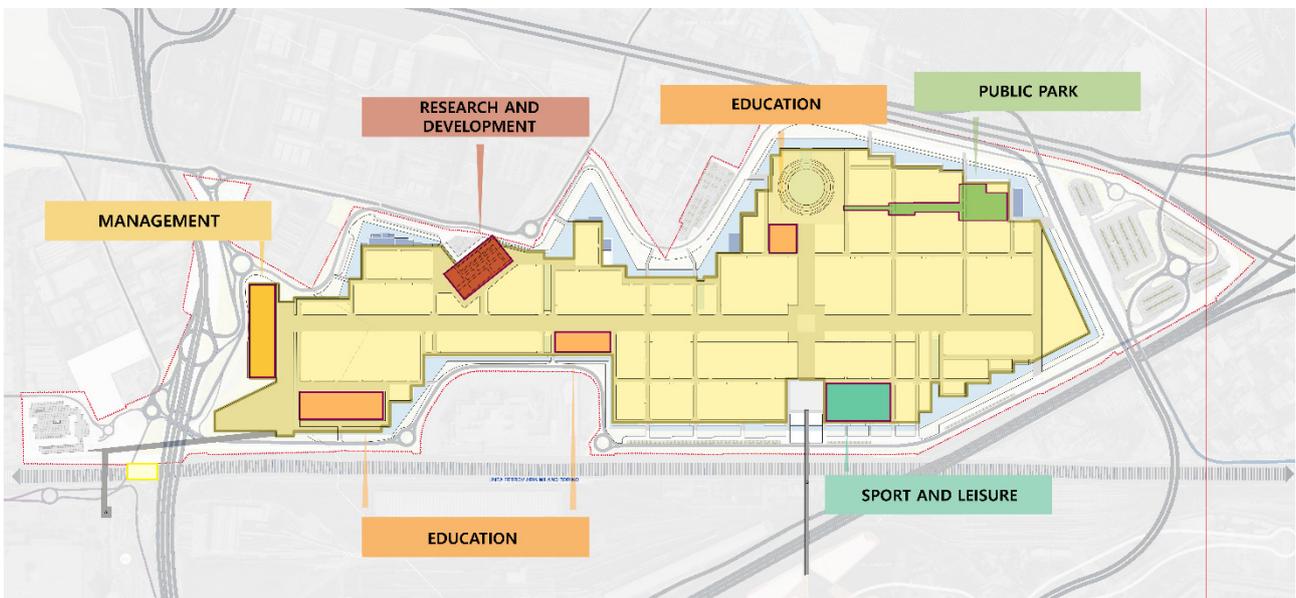


Figure 8 – Structures to be preserved.

Its indelible mark deserves to be protected and improved so that it becomes even more of a symbol for the city. In accordance with the goal of preserving most of the facilities, the guiding design principle might be referred to as “minimal intervention”. Like in the restoration of historic heritage, in this case, great efforts were made to identify the salient features of the place and the structures that could/should remain “in situ”. Thus the first phase of design included the identification of the structures to preserve, by analyzing the

Pavilion, the Open Air Theater, the Cascina Triulza, the Expo Center and the Zero Pavilion (figure 8).

This was the starting point for determining the distribution of uses throughout the site, either by following the indications of the organization, or by looking at the nature of the places themselves. Therefore public functions are concentrated mainly in the eastern area, near the theme park, while private uses such as research centers and businesses are located in the western part of the Cardo (figure 9). Both public



Figure 9 – Functions throughout the site.

and private areas are connected by a generous public space system having the Decumano as its spine in order to guarantee distributions throughout the entire site (figure 10). Analysis and design referred to the different layers composing the site (figure 11). In this way it was possible to isolate elements that make up the “ground slab” and facilitate the design of each one. Each layer was then correlated with the others, reaching a conceptual synthesis with the idea of an “organism/neighborhood” where each part works independently and in harmony with the others.

The existing perimeter infrastructure ring is an Expo legacy so it was left unchanged. It consists of the following elements:

- *private road mobility*: the existing public roads network destined for private vehicles;
- *public mobility*: the existing public transportation network, consisting of the rail, metro and tram networks and road transport, expanded with the addition of an internal electric shuttle service;
- *parking*: the parking areas distributed along the site’s perimeter can satisfy a demand for about 2,500 cars. The

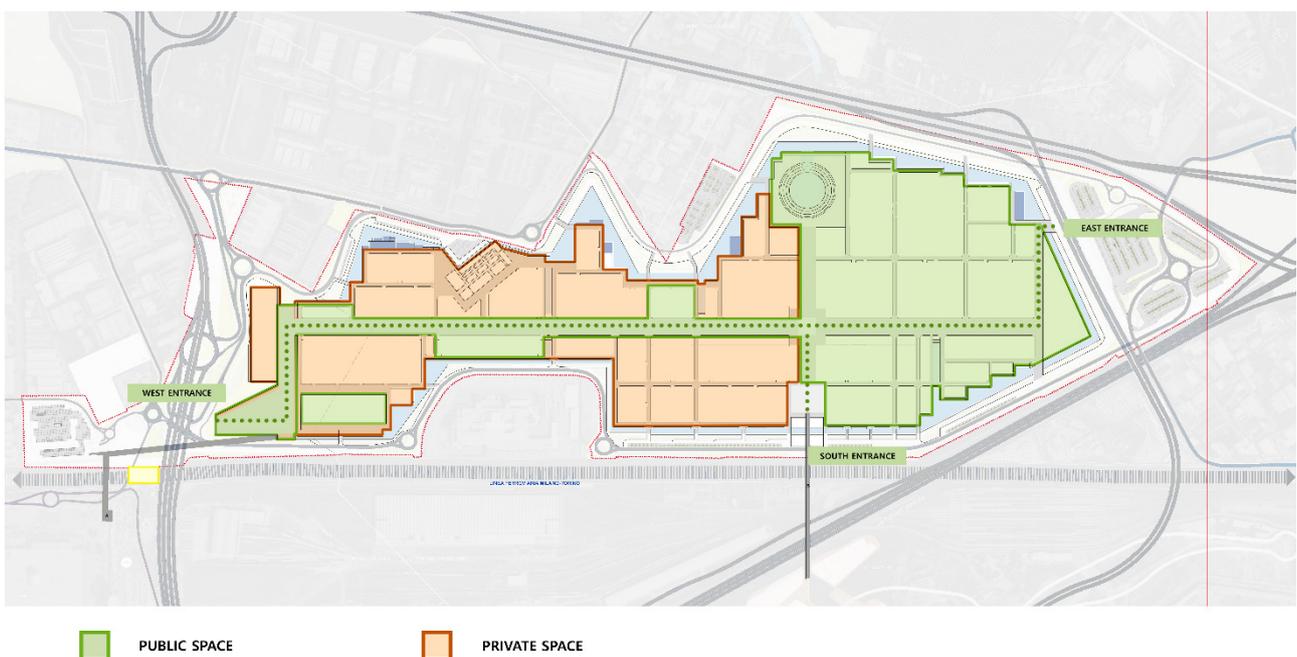


Figure 10 – Public and private space.

largest areas are located at the east and west ends of the Decumano at the public transport interchange nodes;

- *bicycle and pedestrian networks*: as already mentioned, one of the project goals is to encourage soft mobility through cycling and pedestrian networks. In this regard, in addition to the existing cycling network, a bike-sharing service was planned with stations located in strategic points throughout the site;
- *networks for electric mobility*: to ensure healthy air, only electric vehicles can be used within the area. The availability of individual vehicles is guaranteed by a large number of charge and rental stations in all car parks.

As far as lot layout is concerned, the original grid was integrated with new elements. During Expo itself, the site was necessarily divided into narrow and regular lots to optimize space for the numerous pavilions of the various participating countries. New uses will require larger lots and thus spatial reorganization. The road circulation system will make use of the existing one, but the size of the grid will be enlarged.

Water features are some of the site's distinguishing elements, a precious Expo legacy. So the existing hydraulic channel system was preserved.

One of the project's goals is to revive the "Green Expo" con-

cept called for in the original master plan for the site by increasing open green space. The massive introduction of tree and shrub species will create a more naturalistic landscape and will serve to mitigate impacts, purify the air and shade buildings. With an area of 61,700 square meters, the theme park located in the site's eastern part will be its largest green area. Its position is justified by its proximity to the Mediterranean Hill and the Biodiversity Park, which will be enlarged. Finally, with the aim of granting greater flexibility, the new structures are conceived as aggregations of elementary square modules. The buildings shown in the plans occupy the maximum area allowed for each use, taking into account the volumetric and height limitations dictated by building regulations. This kind of modularity also facilitates the construction process; completing building projects in different phases helps rationalize the management of economic and financial resources.

2.3. Financial analysis supporting the feasibility study

In order to obtain the necessary authorizations, a large-scale project like this must undergo the scrutiny of a commission that examines financial feasibility and budgetary aspects in terms of the use of public resources and the costs and

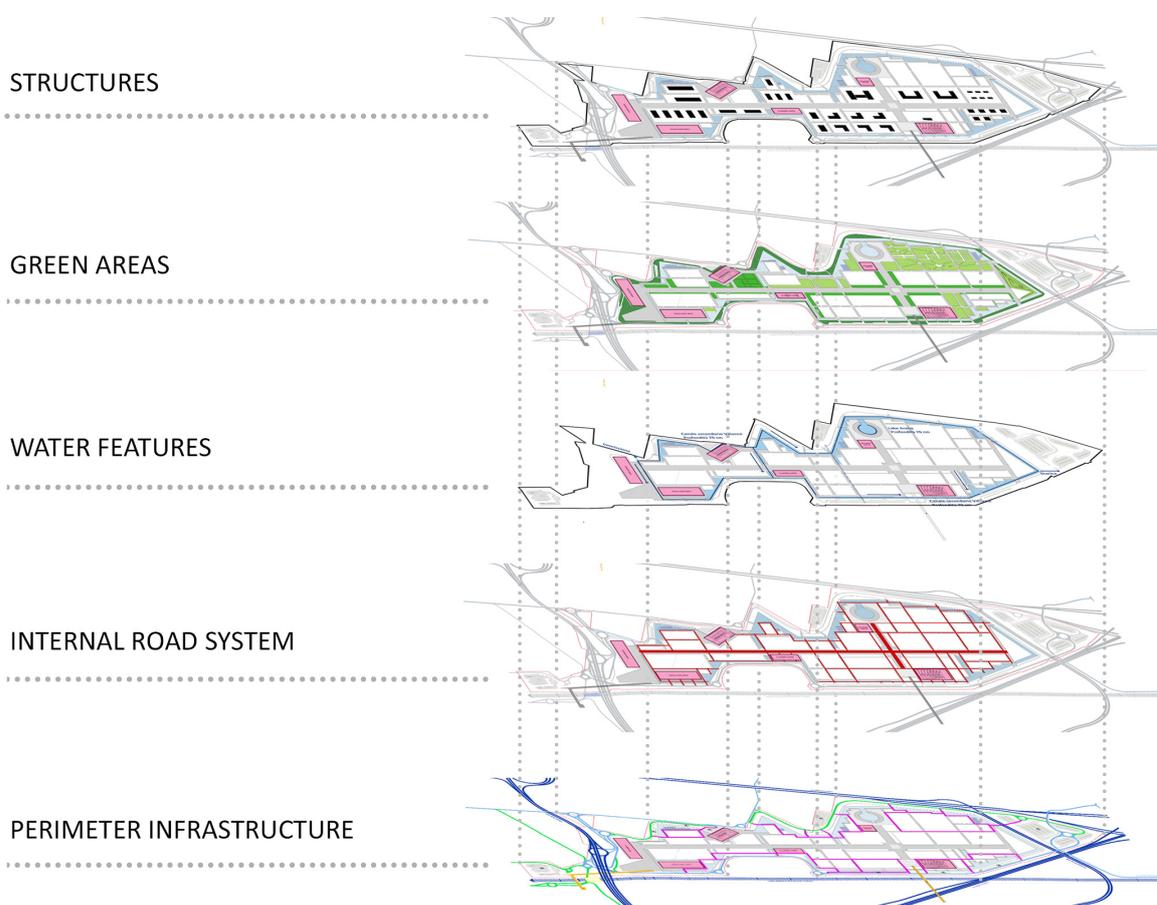


Figure 11 – Project layers.

benefits for the community. This project is no exception. To demonstrate its validity, the plan was also studied from its economic and financial standpoints to resolve any critical points and determine the most suitable investment model for funding the project.

Among the various evaluation methods available, financial analysis was preferred to cost-benefit analysis insofar as it provides rather objective data which can be immediately transferred to studying the project's socio-economic impacts. It expresses the advantages and disadvantages for an investor participating in the design, implementation and/or management of project in monetary terms. The goal of financial analysis is to use the budget estimate of the project's cash flows to calculate appropriate performance indices, in particular the Net Present Value (NPV) and the Internal Rate of Return (IRR), and identifying the preferred option based on the rule of maximizing the above indices (European Commission, 2003). Financial analysis is usually structured by a set of spreadsheets that represent investment cash flow divided into: total investment, operating costs and revenues, funding sources, and the analysis of cash flows for financial sustainability. The project was presented in a preliminary stages of the estimate of costs and revenues is considered to be a rough one.

The first phase of cost estimation consisted in the analysis of the projects to be realized and the individual work necessary to carry them out. The works were classified as:

- civil works: residential facilities, hotels, educational, management;
- infrastructure: interchanges, parking lots, bike paths;
- green space and street furniture.

Costs were estimated by using the parametric costs contained in official regional cost guideline documents and typical costs for specific building types, or they were derived from similar projects in the same area. The greatest costs were for the realization of civil works.

Revenues were calculated considering the potential profitability of each project, estimated through an analysis of Milan's current market or derived from similar projects already built. A summary of the data used the same parameters for each building (areas, daily capacity, annual capacity, capacity factors).

With this data, financial analysis resulted in the necessary information regarding investment costs and project revenues over time. Projections were distributed over a span of 20 years and a discount rate of 5% was applied.

Cost estimation showed that over a five year time frame about € 170,250,000 must be distributed taking into account the timing of each project, specified in the time schedule. The civil works generate the greatest revenues as they include hotels, sports facilities and residential facilities intended for lease. The revenues generated by infrastructure were expressed in terms of energy savings due to the installation of

photovoltaic systems. The theme park is the only work that generates revenue within the "green space and urban furniture" category.

A unique aspect of the project is the fact that the first revenues are recorded as early as the first year, thanks to the sale of a part of the area, which is transferred with its building rights, thus entrusting the realization of part of the structures to operators directly interesting in managing them. Finally, costs for management and maintenance of each project were included and deduced from specialist manuals (Collegio degli Ingegneri e Architetti di Milano, 2014) and from Chambers of Commerce data. Financial analysis was successful as the NPV is positive and the IRR shows that the project would be particularly convenient.

After estimating the preliminary costs of the operation, potential investors must be identified. In addition to the classic distinction between public and private investment, there is another criterion: the object of investment. There can be first direct investment in the design phase and construction of infrastructure and services, generally undertaken by the park's management agency. Funding instruments for these activities are many: subsidies and public calls, long-term loans, inclusion of the park's social capital. In addition, there are investments in individual projects and allocated/incubated companies in the park, made by the same companies involved in the projects, local financial institutions or various types of private investors (Laghi, 2013).

Public investment, together with spontaneous donations, come into play in the early stages of research and formation of the concept. The private investor, on the contrary, appears in project development stage. The latter category produces cash returns in a shorter time frame than the former. Specialized funding agencies represent a first group of investors who can provide resources for the initial construction and promotion of a science park. This funding can take on two different forms: credit or social capital. As a partial guarantee of these loans, the companies are required to conduct efficient management and this can provide the necessary confidence for other groups of investors. Commercial banks are an example of private investors, although they are generally risk averse, and therefore rarely expose themselves in a decisive manner. Investment funds are another major sources of funding; some invest in promising new companies, while others are interested in established businesses. Investment can also be undertaken by venture capital funds. Unfortunately, there are really no Italian operators who can sustain larger operations; this is due to a variety of reasons including the lack of necessary skills in entrepreneurship and experience in the venture capital sector. We must also consider some issues relating to the investment process itself. First and foremost is the lengthy bureaucratic process: the average time

between proposal and payment is about six months, with the fastest private payments in about sixty days. Also, a successful venture capitalist not only has a good capital base, but above all a good network of relationships. Because of these networks and connections, future investments and new customers can be brought into the process. In Italy it is difficult to find venture capitalists with important global networks of connections. A final problem is posed by the probability of success, as the current crisis in Italy discourages large groups from making investing. The current situation creates difficulties tied to economic and financial sustainability that can be problematic for those who manage a park.

Referring specifically to our case study, and according to program agreement directives, the operations can be carried out within an Integrated Intervention Program or its equivalent. It is conceivable that the most convenient solution provides for the approval of a new consortium planning tool, like the Program Agreement, to ensure the participation of public and private capital while also allowing direct citizen participation. In addition, according to the results of financial analysis and given the investment scope, the funding plan will certainly provide for the sharing of work between public and private entities; the latter presumably interested in the implementation of infrastructure and part of the civil works of a public nature.

3. CONCLUSIONS

Although history is full of examples of mismanagement following the conclusion of a large-scale event, there are some governments that have demonstrated competence and sensitivity regarding the question. The superficiality of Italy's spatial planning system is one of the evils that has devastated the country. Renewed attention to issues of sustainability and land conservation are not enough, for the moment, to introduce major changes to our approach to urban planning. The ability of a country to care for its resources is measured precisely on such occasions as post-event management, when the frenzy of deadlines has vanished and media attention is diminishing.

Although in preliminary draft form, this project is intended as a starting point for thinking about the site's future, hoping that Expo 2015 can be remembered not only as the first certified sustainable Universal Exposition, but also as a symbol of the possibility of creating a new livable space and driver of innovation for an entire metropolitan area.

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