URBAN PLANNING AND DESIGN THROUGH PULSAR EFFECTS
EVIDENCE FROM PORTUGUESE URBAN AREAS

JÚLIA LOURENÇO PORTUGAL

At a time when big spectacle events are playing an increasingly important role in urban dynamics in many cities, the identification and quantification of both their adverse and beneficial impacts remains to be done. Large projects such as Olympic G ames, World Expos, soccer cups and, to a lesser extent, European Capitals of Culture and other recurrent events are capable of changing the urban fabric of a city and its organisational patterns in profound and permanent ways.

INTRODUCTION

> 'Pulsars' are defined as the distorting effect on the daily operational running of a city. The type of events described in this paper occur predictably and their impacts can be characterised. If properly structured and with an integrated organisation pulsars can lead to new solutions, avoiding the typical management issues that can interfere with much smaller scale projects. In particular, in a country like Portugal, pulsars can introduce new concepts that may later trickle down to other cities and transform a much larger urban area. Nevertheless, if improperly implemented, the repercussions of these events can severely strain an entire city and its inhabitants and businesses.

> One of the most relevant cases presented in this paper is that of the **Expo 1998** in Lisbon. Expo-98 took place at a 18 ha site bordering the Tagus River at a derelict port area previously full of gas and petrol containers. The overall project (Expo-98 and all urban renovation) amounted to two million euro obtained as follows: 65% from bank loans, 25% from the Portuguese Government and 10% from the European Union. Increases in the amount of foreign visitors in Portugal were estimated at 10% in 1998 and 13% of budget increase (approximately 0,5 million euro). The Expo-98 Management Board argues that these net gains, associated with taxes due and paid, exceeded the amount of money the State donated to this urban project.

< The site opened two weeks after the closing of Expo-98, at the end of September 1998, re-named as *Parque das Nações* (Nations' Park) with some areas closed for refurbishment by blocks and not as a whole construction site. It comprises now an enlarged area of 330 ha. This idea of keeping the public space open to wide access, the fact that some urban anchors remained in function, such as the *Oceanarium* by Peter Chermayeff, the *Pavilion of Portugal* by Alvaro Siza, the new *Railway Station* by Santiago Calatrava, the *Shopping Centre Vasco da Gama* finished recently, the *Pavilions of the International Fair of Lisbon*, later relocated here and the *Atlantic Pavilion* where major cultural and sports events take place, attract more than a million visitors each month to this area where, in 2002, 4.000 people were already living and over 6.000 were working permanently. Currently, in 2010, the numbers have risen to close to 25.000 people currently living in the area and 20.000 others permanently working there.

< As usual, there was also a downside: land speculation, increasing densities and reduced public space, as well as oversupply of some infrastructure, namely marina places still very much underused. Nevertheless, the six gardens and one urban park are remaining there and occupying one third (110 ha) of the total area, which is a very good share in any city of the world. The phasing of the construction, as well as the sale of the plots obeyed a careful strategy of making the area liveable at all time, a remarkable fact in a country where carefully planned global urban areas are very much the exception. This is a successful legacy process considering that so many past (as Seville) and post (as Hanover) Expo Sites have failed.

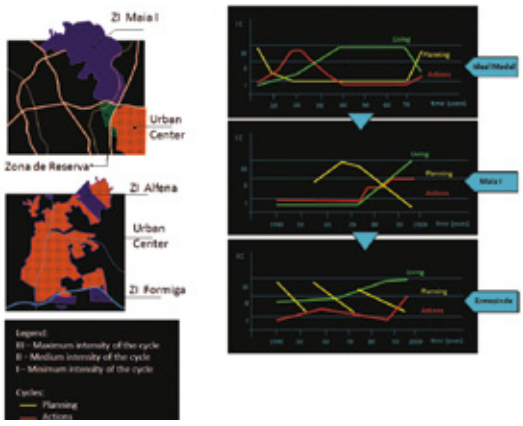
> The following sections of this paper address primarily the Expo-98 event in the context of the Lisbon planning process, major innovations brought to urban image and quality of life, environment and management, as well as the draw-backs. Other interventions in cities with smaller pulsar effects are also presented, such as Porto as European Capital of Culture in 2001 and its approach to the renovation of major public squares, or Coimbra's river front rehabilitation. The pulsar effect is evidenced also in other smaller towns in Portugal in which urban renewal was launched through a mymetical approach, before setting out the conclusions.

THE PLANNING PROCESS MODEL AND THE PULSAR EFFECT

> The model portrayed graphically in Fig. 1 (Lourenço, 2003) shows a typical time period of 70 years of urban development. There is of course a very high intensity in the level of planning at the start of a planning process which tends to decrease as building of infrastructures commences. The investment rises as the projects start and the plan is implemented, the number of people living in a given urban area tends to rise at an exponential rate up to its maximum occupancy and remain reasonably steady for a period of up to 30 years.

> In Fig. 2 the graphic represents the behaviour of the Expo-98 Nation's Park Planning Process. The Nation's Park graphic mirrors the model very closely, albeit in a reduced time frame. This is a very special happening in the history of urban area planning and development. Following are two case studies depicting model divergence which is typical in many planning processes of urban areas. In Maia, the project was delayed because of lack of investment. In the case of Ermezinde, the planning cycle is heavily disrupted every decade, creating a pattern of permanently shifting priorities and plans that are difficult to fully implement before the next shift occurs. This is often due to underinvestment and fragile planning systems, which in due course often leads to either lack of investment due to the difficulty of predicting the ever changing patterns or, much like the population inhabiting the area, is often dissociated from the urban planning process itself and follows other extraneous factors.

< Cities tend not to be homogeneous in their development; several factors can influence the rate of investment and population fixation at certain parts of any town irrespective of urban planning. In and out flow of migrant population fixation booms, cost of housing, work availability are all factors that can interact with urban plan guidelines.



3. An example of detailed Local Plans and deviation from the ideal model – PP6

source:
Lourenço, 2003

EXPO-98 – NATIONS' PARK PLANNING PROCESS

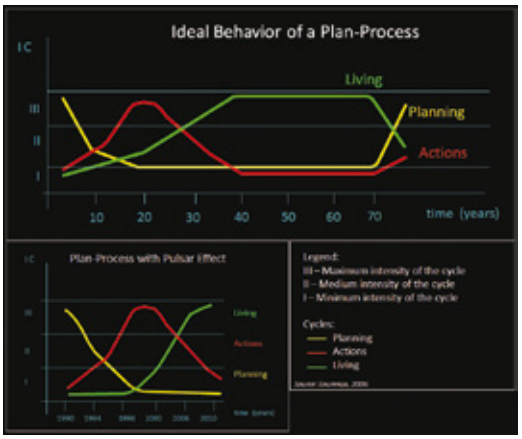
< The Nations' Park site was previously home to large industrial factories, established there since the forties, namely a Petrogal refinery and storage facility. Gas, petrol and other companies' facilities occupied nearly 50 hectares. Also present were the Lisbon Industrial Slaughterhouse, the National Depository for Decommissioned Munitions, a waste water treatment plant, a sanitary landfill and the Beirolas solid waste treatment plant (Fig. 4-6).

< In sum, it was an area of pollution intensive industries, where vacant land was also used to illegally dump waste. No environment or urban planning considerations had been enforced up to the nineties on the sites that were to become Expo-98 area.

< North to this area stood a planned neighbourhood of the sixties without access to the river and to downtown Lisbon. At the eastern side, the much polluted Trancão river established the border with another Municipality. West to this area up to Terreiro

4-6. Views of the area before 1993

source:
Parque Expo'98 S.A.



1-2. Lourenço's Pulsar Effect Model – above; and behaviour of Expo-98 – Nations' Park Planning Process – below

source:
Lourenço, 2003

do Paço where the Portuguese Government main headquarters stand, small and medium industrial firms have been locating over the last forty years without any urban planning. Conflicting interests were said to be occurring between the growing city and the heavy industrialised harbour area. As such, planning ideas were in the air to renovate and upgrade this area when Expo-98 decided to be located there.

> The idea for holding an international exhibition in Lisbon was originally voiced by the National Committee for the Commemoration of the Portuguese Discoveries, a body which studied a number of activities to highlight the importance of the Portuguese discoveries of the 15th century. Still, the thematic dimension of EXPO'98 was not limited to historic commemoration but to preserve the oceans. The global project was indeed comprehensive, for it was in fact two projects tightly coordinated into one. The first was to prepare the Lisbon World Exposition, while the second was designed to renew an urban area covering around 340 hectares of eastern Lisbon. Expo-98 occupied 60 ha if the area of the old Olivais Dock – a 1940's airport for hydroplanes – is accounted for along 2 km of river front.

> The following **AIMS** were set at the time:

1. RE-ESTABLISH THE LINK BETWEEN CITY AND RIVER;

2. RESTORE ENVIRONMENT AND LANDSCAPE AND REDISCOVER USEFULNESS;

3. WEAVE THE DEVELOPMENT INTO THE CITY'S FABRIC AND CONTRIBUTE TO DEFINE THE CITY AS A WHOLE;

4. BECOME A NEW POLE OF ATTRACTION IN ITS OWN RIGHT WITHIN THE GREATER LISBON AREA.

< First of all, it is important to notice that Expo-98 used the existing urban planning legal framework to control land and development. A land policy measure issued in 1975 about priority areas for urban development enabled the Expo-98 Management Board to take over the area and start working on it. This was an irony of destiny at a time when so many urban planners were against Expo-98 development. Usual charges were the costs, the centralisation and the urban expansion of the capital of an already macro-cephalous country. An Urban Development Plan supervised by a Portuguese urban planner with a long career (30 years) and complemented by six detailed plans that were commissioned to six different teams (five to architects, one to landscape architects) were drawn, discussed and approved (Fig. 7).

< One of these detailed plans (PP2) was coordinated by an architect with 20 years of deep involvement in urban plans and specialised in matching their connection with economic development. He was responsible for defining the permanent and ephemeral buildings and locations at Expo-98, after a first plan by a Japanese architect. A team of Portuguese and a few foreign experts were assigned the task to evaluate and monitor the plans and projects proposed. Lisbon Municipality also drew up an urban plan for the area adjoining Expo-98 site.

< Apart from these plans, specific studies were carried out such as the ones for detection of peaks of hydrocarbon pollution in excess of allowable levels. This was especially important for the residential zoning assigned in the approved Development Plan. These studies confirmed that the area's geology featured a layer of impermeable clay, serving as a natural buffer limiting the leaching of contamination deeper into the sub-soil. In fact, oil pollution was rarely detected deeper than 2 meters, with a total volume of soil requiring processing estimated at some 250.000 m^3. There were also soil problems concerning Beirolas landfill, which was the primary recipient of Lisbon's solid waste from 1985 until 1990. Its working life was longer than originally planned, resulting in overuse and

7. An example of a Detailed Local Plan – PP6

source:
Parque Expo'98 S.A.

deficiencies in the leachates drainage and biogas removal systems, as well a degree of instability in landfill slopes detected during site evaluation studies (Coelho, 1995).

INNOVATIONS BROUGHT BY EXPO-98

URBAN IMAGE

> Expo-98 presented a global unified image comprised of 224 modular units, covering a total of 72.500 square metres, not including the special cases of the Portuguese and European Union Pavilions.

> Expo-98's central area was designed to be two things. First, it was to host the most ephemeral happenings, the exposition itself. Second, it was also to serve as the cornerstone of urban renewal efforts. EXPO was designed to have an easily understood and well-orientated urban layout for visitors as well as to have landmarks both for the time of the Expo and the period after (Fig. 8-11). Architects and designers were invited to put forward ideas and, later on, projects for the entrances of Expo-98. The same competitions took place for water games, fountains and lakes that were placed all along the area.

> All these sculptures and existing buildings, such as the 'Petrogal Tower', a gate particularly popular with visitors arriving in tourist buses parking in the southern lots, are still in place nowadays. The river is showcased beside the tree-lined promenades. Dozens of species of trees have been planted, namely oaks, lime trees, banana and other palms, pines and nettle trees, including rare species. A panoramic view stretches before numerous restaurants, bars and coffee shops. The Vasco da Gama Centre and the Oriente Station also have a varied assortment of services, restaurants and shops.

> Nowadays, there exists five kilometres of river-front property but no privatising of the river public domain, which means that anyone can take long strolls by the Tagus. Extensive pathways, green spaces and numerous services are still a unique experience in Lisbon (Fig. 12-15). In fact, the first river-front area to be developed for leisure near Belém, in the forties, does not provide the same atmosphere as it is more zoned (green areas segregated from coffee shops areas) and less extensive. The Business Centre of the Nations' Park was located near the railway station. All office buildings feature split-level architecture (Fig. 16-17), with parking below ground level. Examples of innovative design include the Pavilion of Portugal, the Camões Theatre, the Vasco Da Gama Tower and the Oriente Station.

< Landmarks, such as the Petrogal Tower (Fig. 18) were preserved and kept. Innovations such as the Water Vulcan and the Oceanarium (Fig. 19-20) are innovative sculpture and architecture imported from the USA.

12-15. Residential blocks

source:
Parque Expo'98 S.A.

8-11. Area at the time of Expo-98; May-September 1998

source:
Parque Expo'98 S.A.

16-17. Office and Shopping centre architecture

source:
Parque Expo'98 S.A.

18-20. Urban landmarks

source:
Parque Expo'98 S.A.

URBAN QUALITY OF LIFE

> Lisbon emerged as best quality of living within the major eighteen Portuguese cities (Mendes, 1999; Lourenço *et al.*, 2000 following the operational approach used at the University of Minho and derived from Findlay *et al.*, 1988; Rogerson et al., 1989). This classification associated with the model and weightings adopted was contested by different studies but there are also others (Deelstra, 2000) that give Lisbon as an example of good practice. At the time of Expo-98 a number of services were offered to visitors, namely: drinking fountains, toilet facilities, shaded resting areas (Fig. 18), as well as baby carriage and electric cart rentals, that are kept to this day. Expo-98 was more than just a chance for improving the environment and urban renewal. It was an opportunity to both modernise and internationalise Lisbon.

> The Municipalities of Lisbon and Setúbal worked together for conversion and renewal, ensuring accessibility and transport, when planning shopping centres, services and infrastructure, and for urban planning and in sponsoring ambitious events. The adopted strategy called for building high-quality urban spaces, integrating services like shops and restaurants, schools, leisure and sporting facilities, a hospital and similar services. The Nations' Park incorporates new urban technology such as the Technical Gallery Service Tunnel (Fig. 21-22), housing fibre-optic telecommunications, a central heating and cooling system, and centralised solid-waste collection, in addition to the more traditional public service networks (water and electricity).

In sum, this area brought a contribution of unique, high quality buildings to the creation and consolidation of a new urban skyline, recreating the city's relationship with the eastern river front.

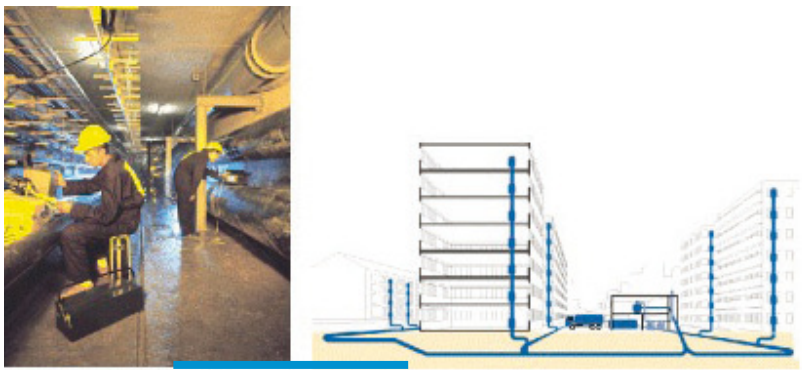
From the initial planning phase, better living in this urban setting was one of the aims. This goal for the moment seems to have been achieved as the estimated quantitative indicators are double the minimum Portuguese requirements for equipment and green areas as well as for parking places. This is particularly evident in Fig. 23 where tree planting along parks, avenues, streets is shown. Notice that the Portuguese standards are higher than the Spanish ones, but lower than the English standards (Lourenço, 2003).

ENVIRONMENTAL QUALITY

Demolition debris deemed non-polluting were recycled in the Nations' Park. Nearly 812.000 tons of concrete, 190.000 tons of stonework, roofing tiles and brick, as well as 60.000 tons of concrete and asphalt sidewalk were processed. Around 5.000 tons of steel, recovered from reinforced concrete were sent for re-melting and new uses.

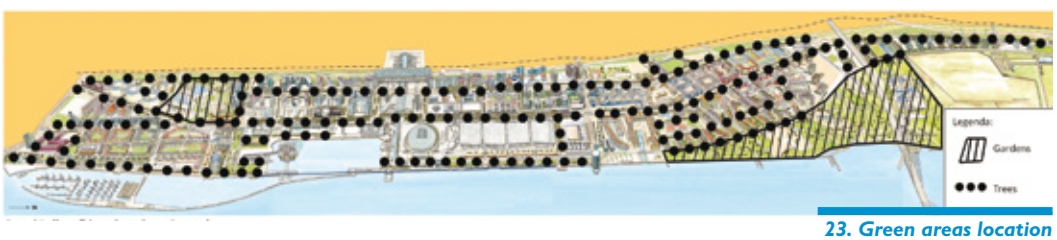
An environmental strategy was drawn. The first objective was to ensure an environmentally-friendly urban landscape for the future users of the Nations' Park where nature could be 'rediscovered', most notably by showcasing the five full kilometers of river front.

For landscaping and urban layout, the environmentally sensitive areas were given special attention, to ensure high-quality urban living. Green spaces flourished, with unimpeded access to the river front (Fig. 24-27). Pedestrian pathways were built, with ample parking as well as incentives to promote the use of public transport. The choice of such environmentally-friendly infrastructures, while ground-breaking in Portugal, reflected their successful use in other European cities. They were directly incorporated into the urban planning process. The central heating and cooling system running on natural gas at considerable energy savings when compared to traditional systems was one of the innovative solutions implemented.



21-22. The Technical Gallery Service Tunnel

source:
Parque Expo'98 S.A.



23. Green areas location

source:
Parque Expo'98 S.A.

24-27. Environmental quality areas

source:
Parque Expo'98 S.A.

> A Monitoring Plan has been drawn which covers the whole of the Nations' Park and environmental concerns, such as soil quality, ground water, runoff and sediment, air pollution, noise, geology, meteorology and a number of quality-of-life criteria. The increasing scope of the Parque Expo Environmental Monitoring Plan warranted the setting up of an Environmental Monitoring Centre (Fig. 25). A full third of the 330-hectares Nations' Park is reserved for green spaces. At present, over 6.500 trees have been permanently planted, with nearly 1.700 on the Expo-98 site. Planting continues, with holes being dug and watering and drainage systems installed. Nearly 600 trees were transplanted, 100 from Lisbon and 500 from the Expo area. Using respectively, traditional methods as well as state-of-the-art German technology, they were first transplanted from their original location to a temporary site while awaiting final planting. Although their number is small when compared to the total of 10.000 trees called for in development plans, the 500 trees are symbols of the integrated solutions during construction. Also, nearly 150.000 m^3 of humus originated from the waste water and solid waste treatment plants located in the area, were spread in the various green areas created. The environmental renewal undertaken at the Nations' Park is relevant because of its innovation, great diversity, quality of its environmental recovery efforts and pedagogic spreading of outcomes.

HUB FOR MULTI-MODAL TRANSPORT

> The Nations' Park is located at a crossroads of major traffic ways, namely the Lisbon Inner Ring Road (CRIL), the National Highway N10, the Vasco da Gama Bridge, the North-South Axis, Oriente Station and a ferry terminal.

28. View of Oriente Railway Station

source:
Parque Expo'98 S.A.

> Oriente Station, with a neo-gothic architecture (Fig. 28), is the hub for the various networks of public transportation serving the eastern area of Lisbon, combined with a metro station, trains, buses, taxis and airport links.

> The construction of the sub-way line and the connections established, namely with the railway system, allowed Lisbon to have, for the first time in its history, a connected mass transportation system. Chelas, a planned neighbourhood from the sixties had, in 1998, and for the first time, subway and urban highway connections to the centre of Lisbon and to the river front (Fig. 29-31).

The eleven parking lots have 5.163 places, exceeding the minimum requirements and making it still easy for visitors to park their cars, at the moment. They are rightly located near Oriente Station and the borders of Expo-98 site. <

29. Expo-98 location in surroundings and Lisbon transportation network

source:
Lourenço, 2003a

30. Subway lines in Lisbon

source:
Lourenço, 2003a based on: www.metrolisboa.pt/default.aspx?tahid=271

31. Railway connections in North Metropolitan Area of Lisbon

source:
Lourenço, 2003a based on: www.metrolisboa.pt/default.aspx?tahid=597

32-33. Animation at Expo-98
source:
Parque Expo'98 S.A.

GLOBAL MANAGEMENT APPROACH

> There was an extensive programme of special events at Expo-98, a lot of them taking place outdoors (Fig. 32-33).

> One of the most famous performances happened daily, just before midnight, at the Olivais Docks – 'Acqua Matrix', a multi-media extravaganza of sights and sounds, in an island stage, with towers and other moving parts, namely a huge inflatable balloon onto which images were projected. At the moment, some events still take place at Sony Plaza with one of the biggest screens existing in open air public arenas in any city. All equipment areas are jointly run and advertised by Park Expo S.A.

> As for public investments, several Pavilions have found a new life, respectively as a Centre of Live Science (former Knowledge of the Seas Pavilion) and the Portuguese Presidency of the Council of Ministers (former Pavilion of Portugal). The Camões Theater houses the National Dance Company and the Lisbon Symphony Orchestra.

34. View of the "Walled" Expo-98 site
source:
Parque Expo'98 S.A.

> Student housing (1.100 beds) for two Lisbon universities has been built among health and education equipments.

> The joint global management was especially relevant for the sale of plots, namely to Cooperatives (Housing Associations) and national and foreign real estate developers, Portuguese/Spanish, Portuguese/Dutch, Portuguese/French consortiums. Other investors include Japanese and German firms as well as big Portuguese private groups. Some of the public car parks, due to their global management are sometimes used for testing ground and car shows for automobile manufactures, or for films of advertising spots. Also, instead of amalgams of fast-food strips, traditional coffee shops, bars and restaurants from various towns in Portugal (just to name, Peter's from Azores, Infantes from Alentejo) were invited to come to Expo-98 site and now they have stayed in the area. It is no wonder therefore, that Nations' Park has become a premier address in the city of Lisbon, featuring an array of multifunctional venue possibilities for conventions, business meetings, parties, shows, etc. A Nations' Park team of professionals assists during all phases of a project. Some events that were happening in Northern Portugal around the town of Porto have relocated here.

Until 2002, property sales have reached 1.113.000 square metres of gross floor space, with sales to both Portuguese and overseas investors. This represents 55% of total possible construction, worth over 350 million Euros. Residential sales account for 707.000 square metres of the total, with the remaining 406.000 square metres for commercial purposes.

DRAWBACKS: A FIRST IMPRESSION

The need to find timely ways compatible with Expo-98 development may have meant faster solutions and more expenditure for several tasks. Sidewalk pavements already portray this problem. The walled Expo-98 site has given birth to a somewhat 'walled' Nations' Park area, surrounded by highways and a railway line (Fig. 34).

As can be easily noticed and felt in the adopted model, the highways surrounding Expo-98 exclude pedestrians. In effect, the Chelas area transformed into a ghetto, and for decades it will need much positive promotion before attracting middle-class population and not just the most poor among Lisbon inhabitants.

The densification of the built environment seems to be happening not only at the former Expo-98 site but in the surrounding areas (Fig. 35-36).

In some cases, the dominance of beauty over function (see Oriente Station) can be clearly felt, especially at winter time when this very long open-sided railway station can be particularly uncomfortable for passengers.

This analysis also applies to the glass architecture that, although supplemented by cooling devices such as running water roofs and shading elements, may be more energy-wastful than previously expected.

35-36. The densification of the site
source:
Parque Expo'98 S.A.

PULSAR EFFECT OUTSIDE OF BIG EVENTS

> Throughout Portugal several projects have been implemented to revitalise urban areas, reform old structures or even implement new mass transport systems to entire cities. Despite the smaller size of each of these, their scope can often be as far reaching as to affect urban development in nearby towns.

> The *Casa da Música* project in the city of Porto reflected a large financial investment to be implemented during and after Porto 2001 European Capital of Culture. As a result the greens of the nearby Boavista roundabout were made 'cleaner', despite some controversial removal of old trees and all of the bush areas to not only clear the visual clutter but also to allow the building to be seen from across the roundabout. The previously crime prone and obscured area is now fairly safe and the constant motor and pedestrian traffic and people injected fresh life into the area which had experienced decline due to the competing *Matosinhos mall*. Even though the structure outside was created as mostly a gathering and effective vantage point for the building itself. It has attracted a lot of attention from teenagers as it boasts a reasonably ample traffic free area and its architecture (the side of the building features a steep wind guard ramp and several rails) are used as a skating and biking zone. As this cultural equipment project was not conceived within a detailed urban plan, nearby areas started to undergo projects for more modern, taller buildings than previously existing ones. This forced negotiations between private developers and the Municipality and, on the whole, after a lot of time and polemic, some consensus prevailed. Most of the old buildings located adjacent to *Casa da Música* have been rehabilitated and not demolished. But without a detailed plan, it was much more difficult to preserve the views on that costly monument. On the back, tall buildings have been built, lowering the value of the west perspective.

> Without going into a debate about the merits of the 'clean' areas and its still controversial thermal comfort consequences, the city's commissioned architects prioritised the almost complete removal of several greens in urban squares resulting in a much greyer area with its own advantages as well as disadvantages. For instance, in the Aliados Avenue in front of the City Hall, the grassy areas and the plants around it were removed and replaced by a duller and 'cleaner' expanse. The replacement of the traditional Portuguese pavements with more stable and smooth granite opened up the avenue to temporary outdoor pavilion bars and cafes in the public space which helped mitigate the otherwise complete lack of resting benches and leisure areas.

CONCLUSIONS

< The quality of urban image and environment is very important in planning a successfully integrated project. Upgrading the environment should always be a primary concern when dealing with either large or small scale, Pulsar effect inducing projects.

< Expo-98 greatly improved the accessibility to mass transportation systems in Lisbon which had an enduring and visible effect on both housing and business investments. Parque Expo S.A. outstanding performance during the Expo had repercussions not only on its own business ventures, but brought a range of different methods, artistic and technical concepts to a broad audience. For example, the Portuguese Government entered into further contracts with it to assist urban renewal in several other Portuguese and foreign towns, in Brazil and North African countries for example.

< Physical planning was a very important tool in the urban renewal projects of both Expo-98 – Nations' Park and all other POLIS programmes throughout Portugal. Detailed local urban plans should be approved before the proposed actions are implemented. Nevertheless, negotiations during the planning process are vital to secure public space and environmental urban quality in the surrounding spaces. The Pulsar effect model can become a vital tool to monitor ongoing project development in both large scale enterprises and local renewal and municipal planning projects.