Cycling as best practice for urban renovation. Study case: The city of Genoa

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Abstract[1]

This paper analysis urban cycling as a fundamental element of sustainable mobility. There are many International examples that clearly show how is possible to evolve modern cities into more livable spaces promoting cycling as a dayli way of trasport. Italy has to learn from other European experiences to ensure a better quality of life to its citizens and to renovate its urban configuration. The authors present different solutions that can be undertaken to boost cycling in Genoa. Several recommendations are reported to do a correct Sustainable Urban Mobility Plan where cycling have to be considered as well as the other mean of transport becoming an essential element for urban development and renovation.

1. Cycling as best practice

The developing world is rapidly urbanizing and urban mobility it's become a global challenge. Transports and mobility are fundamental for every kind of urban policy; they are related to all territorial ambits and scales. Key issues of urban mobility are: free-flowing and greener towns and cities (lees air pollution, noise,...), smarter urban mobility and urban transport which is accessible, safe and secure for all citizens. Urban mobility impacts not only the health and wellbeing of urban residents, but it's also capital for economic productivity (traffic congestion management,...), energy efficiency and environmental preservation of urban areas.

This paper analysis urban cycling as a fundamental element of sustainable mobility, a form of mobility that is sustainable, energy-efficient and respectful of the environment. Sustainable mobility achieves the main goals of mobility and safety, but also cares about many other important issues facing environmental, economic and social problems. This kind of mobility seeks to improve public health, preserve natural resources, support energy security, developing green economy sectors and providing mobility to disadvantaged people. "Sustainable mobility provides an alternative paradigm within which to investigate the complexity of cities, and to strengthen the links between land use and transport. The city is the most sustainable urban form and it has to provide the location where most (70–80%) of the world's population will live" (Banister, 2008).

A correct Sustainable Urban Mobility Plan (SUMP)[2] has to integrate urban mobility into extra-urban transport, encouraging a shift toward more sustainable modes as public transport, cycling or walking. A SUMP takes into consideration all the possible interactions between different problems, always keeping in mind the components (environmental, economic and social) of sustainability. Planning for urban transport future must take the citizens as the focus: as travelers, as business people, as consumers, as customers,... Last but not least a Sustainable Urban Mobility Plan as to consider cycling as a daily way of transport not only an hobby. Cycling can have many advantages as a short-distance means of travel in urban areas: it is environmentally friendly – without emissions and noise nuisance; provides cost-effective mobility and offers an opportunity for health and physical fitness by regular exercise. Bicycles are the ideal form of transport for distances up to five kilometers, so considering that 10% of car journeys are shorter than a kilometer, 30% are shorter than three kilometers and 50% are shorter than five kilometers it's possible to understand cycling potentiality.

"Academic research has also boomed in recent years, with a vast increase in research and publication on all aspects of cycling" (Buehler, Pucher, 2012). The authors analyzed different International best practices about cycling to capitalize and disseminate these experiences to other Italian realities, in particular the case of Genoa has been studied. Different aspects of cycling has been considered: daily travels (home to work travel), cycle lane planning, calm traffic actions and different interventions to promote and to increase cycling.

Bicycles utilization varies widely, whereas bicycles account

1. Francesca Pirlone wrote the first chapter "Cycling as best practice" and the last one "Cycling proposals and recommendation for the city of Genoa". The described researches in the last chapter are undertaken inside the Urban Planning classes of the Department of Civil, Chemical and Environmental Engineering (years 2012/13 – 2013/14) of which Francesca Pirlone is the charged professor.
Selena Candia wrote the second chapter "How Cycling could contribute to city renovation – International good practices" and the third one "Study case: the city of Genoa".

2. European Commission, Directorate-General for Mobility and Transport, Guidelines Developing and implementing a sustainable urban mobility plan, Brussels 2013.

for 27% of total mileage in the Netherlands, where the average distance cycled per inhabitant in a year exceeds 1 000 kilometers, far less use is made of bicycles in most other countries with similar geographical and economic conditions. Nevertheless cycling can be considered one of the best practice in sustainable transport in conformity with the general best practice definition a method or technique that has consistently shown results superior to those achieved with other means. Indeed cycling benefits generally surpass the benefits related to other mean of transport: frequent use of the bicycle is a very good way to have regular physical activity, cycling doesn't contribute to air pollution and doesn't produce any noise. The adoption of cycling can also have significant impact in mitigating a variety of the costs associated both with the usage of public and private transportation methods. These costs are related to time, congestion, vehicle operating expenses and health. But if the benefits of cycling are many the relative cost are not so high in comparison to other mean of transport: 1km of Motorway/Road costs the equivalent of 110 kms of bikeway and 1km of Bus way costs the equivalent of 138 kms of bikeway.

Of primary importance to transfer a best practice from a city to another, it's to ensure that the context from which the practice is derived is comparable to the context in which it will be applied. External conditions have to include advantageous or disadvantageous political and economic conditions, social drivers or inhibitors, citizens habits,... So it's necessary to choose the best correction factors to use. One of this factors that mainly influences cycling success is the diffusion of a cycling culture between both citizens. Also the presence or the absence of a strong political commitment could strongly influence cycling diffusion.

Cycle cities are the future and cycling could be the catalyst for a 21st Century urban renovation. Italy has to learn from other European experiences to ensure a better quality of life to its citizens and to renovate its urban configuration.

2. How Cycling could contribute to city renovation. International good practices

There are many International examples that clearly show how is possible to evolve modern cities into more livable spaces. "A growing number of policy experts, urban planners, and transportation experts are concerned that we have built our communities so it is difficult, and in many cases dangerous, to walk or bike and have thus engineered physical activity out of our daily lives. Approaches to urban design termed Smart Growth and New Urbanism have emerged in response to the need to improve air quality, solve traffic congestion, and promote better overall quality of life" (Saelens et al., 2003). It's possible to tackle the overwhelming challenges of this urban age supporting sustainable development and bicycles are key actors to plan future liveable cities. Cycling holds an unique transformative influence for cities, playing an active role in sustainable urbanism and development. The bicycle has not to be used as a gap-filler but as an element for the success of urban development: bicycles are a transformative tool to bring human scale back into towns. The misuse of modern urban space is partially caused by cars, they consume enormous resources and are impacting on the environment. Pollution constitutes not only a threat to the historic heritage but is above all a health danger through both atmospheric pollution and noise. It must be also considered the economic cost of traffic jams that has now reached critical proportions. Different studies show that traffic congestion costs Europe about 1% of Gross Domestic Product (GDP) every year. Even if the bicycle is not the only solution to traffic and environmental problems in towns, it represents a solution which fits perfectly into any general policy which seeks to re-enhance the urban environment and improve the quality of a town and it mobilizes comparatively few financial resources. By combining measures to promote cycling and public transport, towns can succeed in lowering the car use rate and every day many European cities demonstrate that a reduction in the use of private cars is not just desirable but feasible. Amsterdam, Barcelona, Bremen, Copenhagen, Edinburgh, Ferrara, Graz and Strasbourg apply incentives that favor public transport, car-sharing and bicycles, along with restrictive measures on the use of private cars in town centers. These cities do not harm their economic growth or access to their shopping centers. In fact, they promote them because they understand that uncontrolled use of cars for individual journeys is no longer compatible with easy mobility for the majority of citizens. It's also important to remember that bicyclists represent potential customers who can bring revenue into the community/city. And when a particular bicycling destination is so appealing to bicyclists that they will come from far away to enjoy it, the money they bring with them can be significant. More money stand for a richer city that can fund renovation projects becoming more and more appealing. How various cycling cultures across the globe can learn from each other? Here below are reported some best practices analyzed by this research as: Seville, Munich and Bordeaux. Each of this example is significant for a specific cycling aspect. Seville shows how a strong investment in cycling infrastructure could convince people to shift toward cycling; Munich example demonstrates the importance of a good cycling campaign and the importance of a widely integrated network; Bordeaux is a best practice for cycle tourism.

Seville, the capital of Andalucia in the far south of Spain, has become a good example for sustainable transport[3]. It is a liv-

3. Walker P., How Seville transformed itself into the cycling capital of

ing proof that any urban area can get lots of people on the bikes investing in cycling infrastructures providing safe lanes on which they can ride. Seville's success was so important and evident – the number of bike trips multiplied 11-fold in a few years – that municipal officials have just started extending the model to other cities in the region. The average number of bikes used daily in the city rose from just over 6,000 to more than 70,000. Seville also has a bike sharing system, like those in Paris and London, called SEVici, with 2,500 bikes and 250 docking stations. Before the lanes were built, Seville had about 10 bikes shops. Now it has around 50 multiplying economic benefits. The effect is also being felt in Seville's vital tourism industry. On Tripadvisor, the traveler-recommended places of attractions and activities in the city are always connected to bike tours.

Munich is planning to increase cycling levels with impressive investments above all in marketing to give the bicycle a higher status among the citizens[4]. A good campaign could really shift a significant number of people toward cycling and Munich is aware of that. The city already has good cycling infrastructures but continues planning for more. Almost the 20% of travels are made riding a bicycles and the 80% of the population own a bicycle. Munich is also a best practice for cycling integration with other means of transport. It's easy for its citizens to park their bicycles and take trains, trams, ... Moreover it's also for them possible to take the bicycle on public transport.

Bordeaux is the first cycling city of France with more than 200 km of cycling lane inside the city and 400 including the surrounding[5]. The city decided to boost soft urban transportation system – tram lines and cycling networks - since 2002 when it was listed as a UNESCO World Heritage Site. All these cycling lane kilometers are ideal for cycle tourists, that are more and more choosing Bordeaux for their journeys mixing sport with food and wine degustation. This growth of tourists, caused by cycle tourism, is very positive not only for city businesses but also for local product trade. Tourism development also encouraged city renovation.

3 Study case: the city of Genoa

Genoa is sixth largest city in Italy with a population of 594,904. it's one of Europe's largest cities on the Mediterranean Sea and the largest seaport in Italy. The city stretches along the coast for about 30 kilometers and its territory is extended between the Mediterranean sea and the Apennine. Genoa has a Mediterranean climate. The average yearly temperature is around 19 °C during the day and 13 °C at night. This

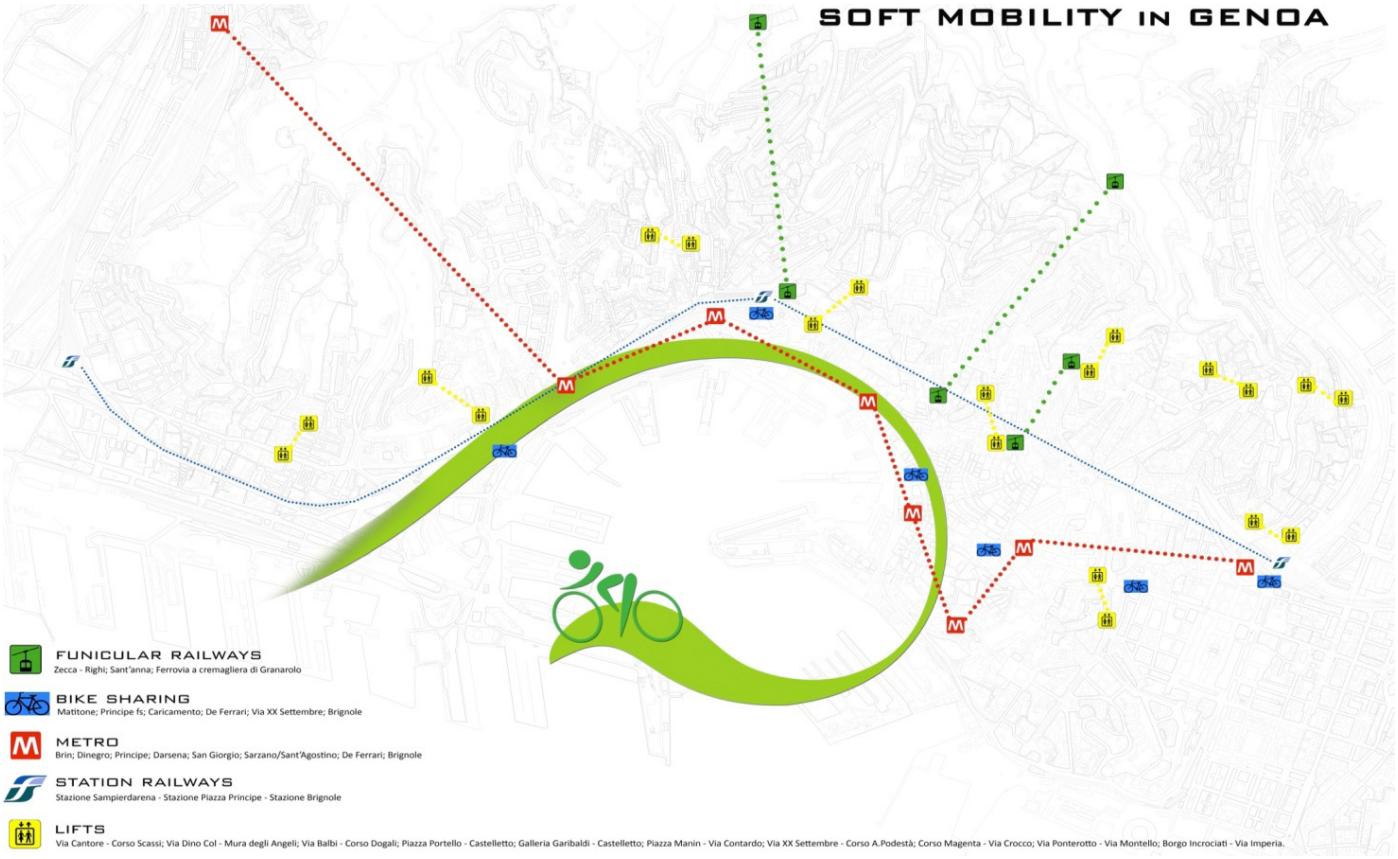


Figure 1 – Soft mobility in Genoa.

southern Europe, The Guardian 2015.

4. Copenhagenizeeu, The 20 Most Bike-Friendly Cities In The World, 2013.

climate is really optimum for cycling.
Genoa old town is a labyrinth of ancient lanes, palaces, medieval walls, turrets and bell towers. Streets here are very narrows, sometimes even only 1,50 meter larger. For this reason almost all the city center is a pedestrian zone; cars are not allowed to circulate inside almost everywhere. Bicycles instead can drive everywhere in the city center without restrictions. Genoa's territory is very hilly with a long flat costal road that links all the districts built on the hills. Others flat area are along the main torrents: Bisagno and Polcevera. For this reason in Genoa there are many electric bicycles, more than other European cities. The majority of Genoa's population chooses sustainable transport mainly walking and public transport but the levels of cycling are really low (see figure 2). A recent survey reported that cycling in Genoa is less than 1%, this level is particularly low even compared to other cities in Italy and Europe with similar geography and climate. This research investigates main factors that are limiting cycling in Genoa:

- streets have not been designed specifically to facilitate or encourage cycling. They are in fact narrow and due to the hilly terrain, characterized by steep inclines;
- slopes;
- lack of cycling infrastructures;
- lack of a real cycling culture;
- people from Genoa consider cycling dangerous.

Nevertheless in the last three years is more easy to find new bikers in Genoa. This is due to different reasons: cause to the global crisis is more difficult for people to maintain car cost (insurance, fuel, ...); people are more aware of environmental problems and bicycles are a very ecologic mean of transport; cycling culture is spreading around Europe. This demonstrates that with good cycling implementation plan is possible to enhance this positive trend of bikers' growth. It's very important to realize new infrastructures, safer lanes and promotion campaigns to boost people in favor of cycling. The 29% of cycling travels are made to go to work, the 23% for leisure, the 6% to go shopping and the 6% as an inter-modality way.

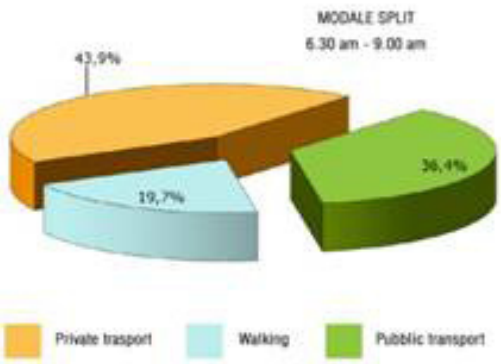


Figure 2 – Way of travel in Genoa. Source: Municipality of Genoa.

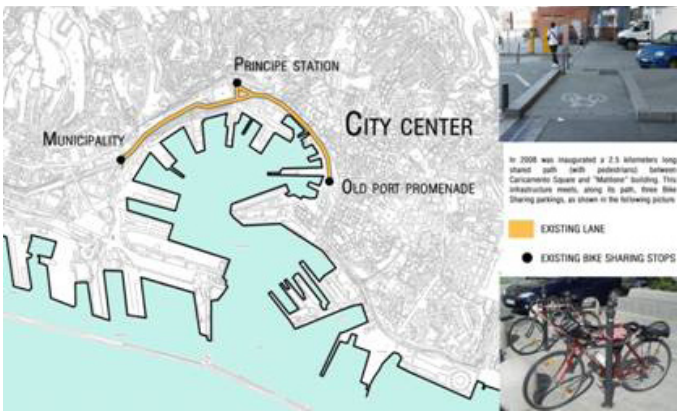


Figure 3 – Genoa's existing cycle lane.

The first bicycle lane in Genoa was inaugurated 2008 (see figure 3), but this infrastructure can't guarantee biker safety because it's only 2.5 kilometers of long shared path (with pedestrian). This infrastructure meets, along its path three bike sharing parking and it ends in the city center, where almost everywhere, cars are not allowed to enter. Genoa old town is a pedestrian area where bicycles can circulate but there is any specific signage for them. This lack of signage is very dangerous because could cause accidents between bicycles and pedestrians.
Different initiatives shows that people in Genoa are becoming aware about cycling benefits. For example with the initiative Bike to work, bikers organize their itinerary to go to work with other bikers, they meet each other on the street and then they ride together to the city center. This is possible thanks to a specific web site[5] where bikers can find their own itineraries. This system gets the way to work safer for bikers, because it's easy for a biker to be seen by cars if he rides in a compact group. Moreover each Bike to work group has a leader, an expert city biker who teaches to the other simply advises to survive in the traffic. Considering cycling as form of transport to go to work is one of the easiest ways to fit exercise into daily routine. It makes people save money and it is good for the environment.
In Genoa there is also a very small bike sharing system with four bike stations. Members receive a contactless membership card which allows them to unlock the bikes from the docking station and cycling around the city. The annual cost of this card is 40 €, with 5€ of recharge and 5€ of insurance. People have to pay an extra euro for each half an hour of riding except the first one. Data analyzed by the Municipality of Genoa show that the 40% of transfer using the bike sharing system, aren't done to go to work but for short occasional travels (for example to go shopping). This bike sharing system used for the first two years (2008-2010) electric bicycles. After that period all the electrical bikes were replaced with

5. http://www.adbgenova.it/bike2work

normal ones because different problems due to electric batteries (that were not so reliable) were verified. Public investments in cycling infrastructures are indispensable to support the use of bicycles. The Genoa experience shows that the lack of a wide cycling network and of a strong cycling policy prevent people from cycling. The general suggestion is "do it good or don't it at all" (Pascal, 2014).

4. Cycling proposals and recommendation for the city of Genoa

Different solutions can be undertaken to boost cycling in Genoa. The University of Genoa – Department of Civil, Chemical and Environmental Engineering – is analyzing best practices about Soft mobility and it is formulating new solutions and proposals[6].

As it's reported in the previous chapter cycling in Genoa has to face to several problems, such as slopes, intersections, safety, lack of a real cycling culture,... All these problems could be solved with a good cycling implementation plan. It's true that Genoa has many slopes but the majority of people live along the costal line or along the two main streams on the level ground. A cycle lane along the sea and these valleys could connect almost all Genoa's districts making people cycling in flats. To reach also the houses built on the mountains, the cycling implementation plan has to be integrated with other public transport systems as lifts, funiculars and buses in a correct Sustainable Urban Mobility Plan (SUMP). Other problems such as interactions and safety could be easily solved with different systems: colored cycle tracks, advanced stop lines and traffic signals. Colored cycle tracks have a physical separation between motorized traffic and cyclists, instead of a simple stripe and the place dedicated to cyclist is colored to make cycling lanes more visible; Advanced stop lines are marked box where cyclist can wait when traffic lights are red, they are place in front of motor vehicles making cyclists more visible to drivers while giving them a head start through the intersection when the lights turn green; Traffic Signals are signals dedicated to cyclists which facilitate the bicycle usage, they can manage and coordinate traffic (motorized and non-motorized) and increase safety. All these systems are used in many cycle cities such as Seville, Bordeaux, Munich,... and they could be considered as a best practice transferable to Genoa reality. The main problems in Genoa - according to this research - are related to policy makers' support and local culture. With a strong political commitment it's possible to achieve a correct SUMP giving to local people all the infrastructures that they need to ride safely. Local interest, thank to a cultural shift to cycling, could encourage policy makers to boost cycling. These two elements have to coexist to fulfill concrete results. In Genoa slopes and narrow streets are mentioned as an excuse by both policy makers and local people. It's easier to say that Genoa it's different from other towns, where cycling is largely used, instead of adopting a correct cycling implementation plan or changing local habits. Most of the major cycle cities have to face several problems connect to climate that are not present in Genoa where people can benefit from Mediterranean weather. A high quality network of cycle routes - along the sea and the two main stream - could connect people to the places they want to go to. Moreover it's possible to gain more space for cycle tracks making specific agreements with the Port Authority. In Genoa streets are not really huge to contain cycle lanes in both directions but along the cost, inside the port area, a lot of place is underutilized. Another solution could be to create mixed paths – pedestrian and cycling – in every district allowing motorized traffic only in the border streets.

Here below are reported tree project proposals that seek to renovate the city of Genoa towards cycling. These three ideas have to be considered as a part inside a general Sustainable Urban Mobility Plan as described above. The first project is about Genoa's inner city regeneration. Analyzing the existing interactions between all the possible means of transport inside the old town of Genoa it was possible to identify two main systems. The first one is an external path that surrounds the city center. According to this system is possible for people traveling by busses or cars to enter Genoa's old town. The second is a system composed by many narrow streets that form the historical urban tissue. This is accessible only on foot or by bike. The project aims to connect and integrate these two systems with a new one dedicated to bicycles. This cycle path strengths and enhances the connections between the city center and the rest of Genoa giving a central role to this part of town. The historic center of Genoa is a place to be explored and lived not only walking but also cycling by local city members and by tourists. Cycle tourism is a growing sector (see figure 4).

Cities have to consider it to attract more and more tourists. This is possible giving the right services (bike sharing, cycle lanes, parking for bicycles, interactive maps,..). The cycle path inside Genoa city center seeks to make the city more attractive and liveable. Touristic tours will be accessible for bikers and they would be allowed to drive from a place to another using also public transport as busses or trains. Public or private investors could be interested in funding such infrastructures to boost tourism because more tourists stand for more money and local economic growth for public (transport, museums, ...) and private (hotel, restaurants, ...)

6. These researches are undertaken inside the Urban Planning classes of the Department of Civil, Chemical and Environmental Engineering (years 2012/13 – 2013/14).

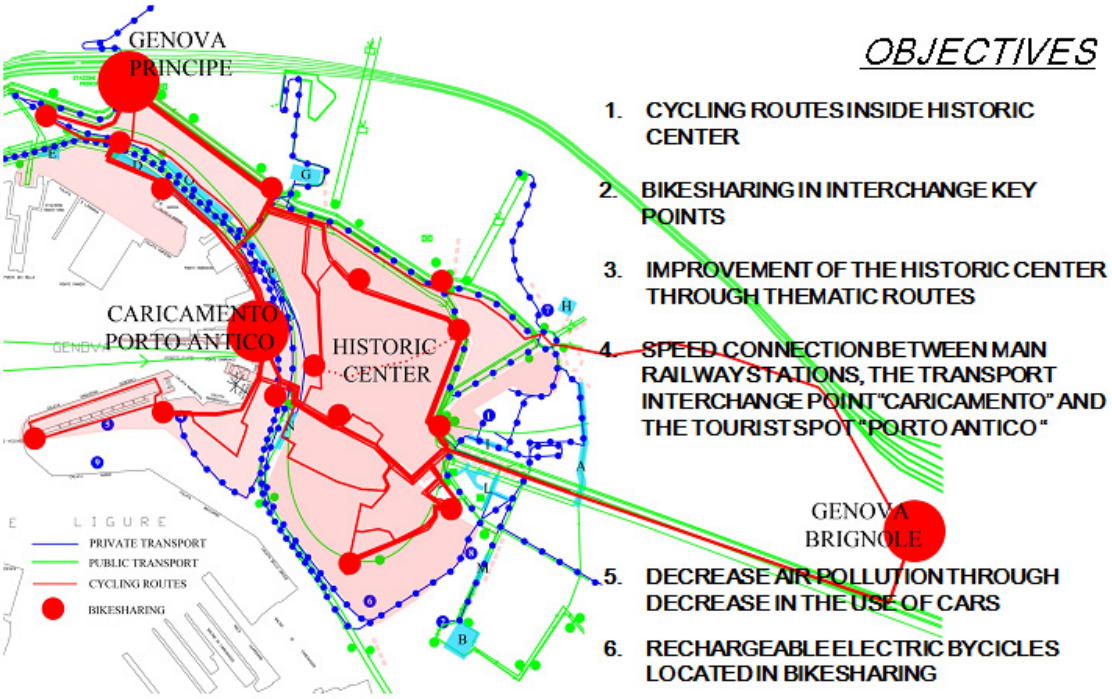


Figure 4 – Cycling inside Genoa old town: Objectives. First project proposal.

sectors. This project outlines different thematic zones and paths to better respond to tourist and city member needs. For example there is a thematic path that links all the historical monuments and museums. This path will be recognizable by a colored mark (see figure 5).

The second project, here reported, analyses Genoa's existing cycling lane highlighting its critical elements (obstacles, bumps, bus stops, crossroads,...see figures 6-7). For each of them the project proposes new solutions to obtain a cycling network without interruptions. Actually the spatial continuity isn't guarantee because the territory of Genoa is managed by two different Authorities: the Municipality and the Port Authority. This project create an unified cycle lane cooperating with both this Authorities. Moreover this new lane it's considered as a renovation element. Specific solutions will be undertaken to get the crossed part of town more liveable such as new gardens, benches and new trees will be planted to protect the pedestrian and cycling path.

The objective of the third project Monrail and cycle path is to understand and explore the complexity of one of city's internal valley – along the stream Bisagno -. In particular the public and private transport is analyzed. After a previous analysis about all the existent constraints according to local urban plans – PUC/ Genoa Local Plan, PUM/ Local Mobility Plan, it was possible to set real proposition to solve local traffic congestion problems. The solution is organized in two parts. One regards public transportation and foresees to create a new monorail service. The second wants to define a 4 km cycle lane. These infrastructures will renovate this part of town, developing local opportunities of growth. Moreover the project connects, in a soft way, four important sites: the local fair, the central railway line, the stadium and the main cemetery (see figures 8-9).

All these proposals show how cycling could be important for urban renovation not only for city centers but also for outside districts. Cycling could be seen as a catalyst factor for economic development and social inclusion. Cycling has many other benefits: it's a clean and economical way of transport and it's really healthy. All these examples prove the advantages of a sustainable urban transformation, but how is it possible to pass from idea to real? How is it possible to deeply transform/renovate modern towns starting from cycling? This paper found two key factors liming or facilitating cycling: Cycling Policy and Cycling Culture.

- Cycling Policy: Public Authorities have to boost cycling providing safe, accessible and convenient facilities and supporting, encouraging the use of bicycles. A good cycling policy has to produce cycling development plans – Master plans – and to guarantee a continuous cycling support even after police maker changings. A strong local commitment could also attract private investors. Municipalities are the initiator of the cycling investment but a key role can be play by private companies in exchange for advertisement. Many International examples[7] prove that a perfect balance between private and

7. The Barclays Cycle Hire (London, UK) is a good example of combination of public and private investment. Initiated by the municipal government the private investment involved is substantial: Barclays contributed 25 million pounds in exchange for being the name carrier of the prestigious project

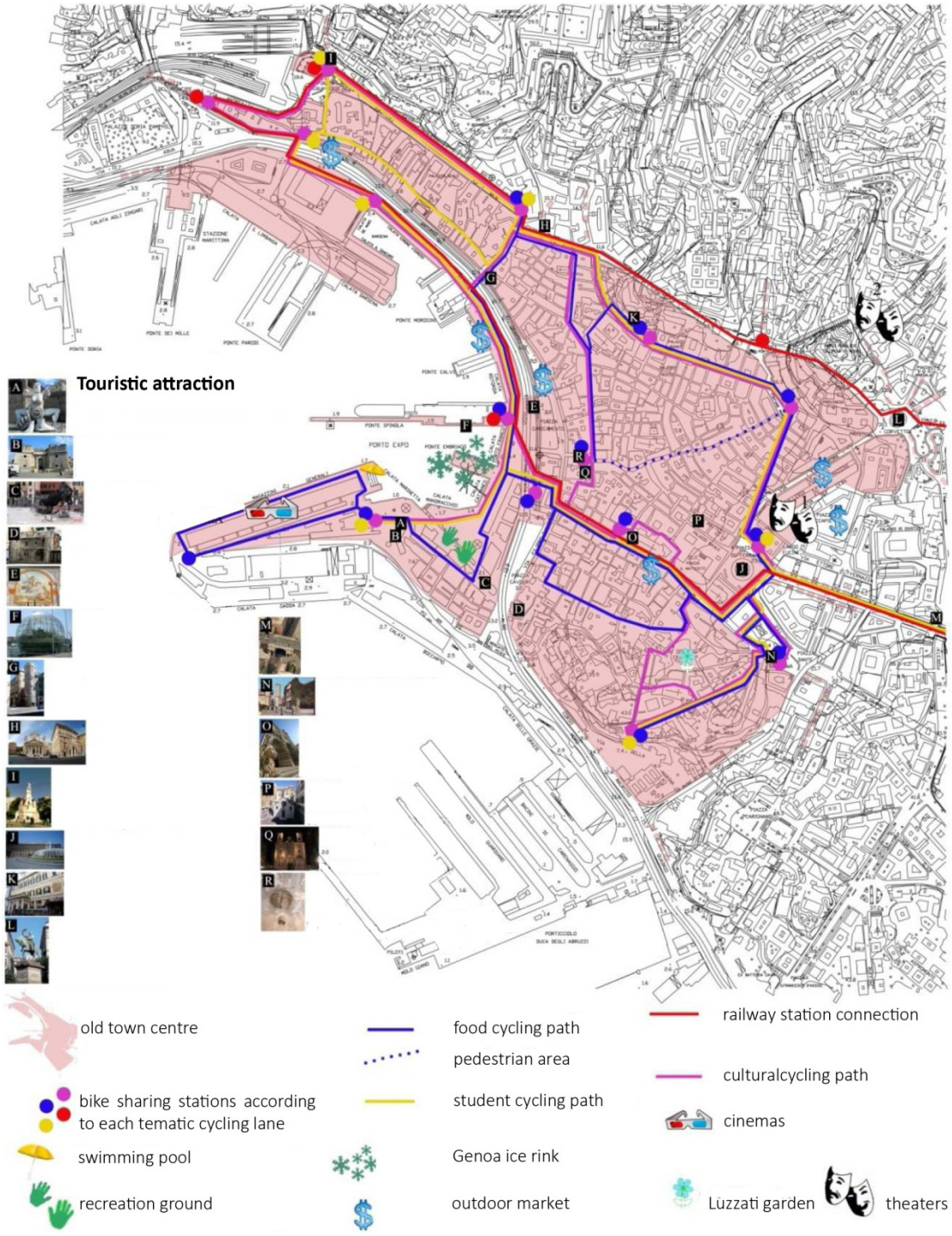
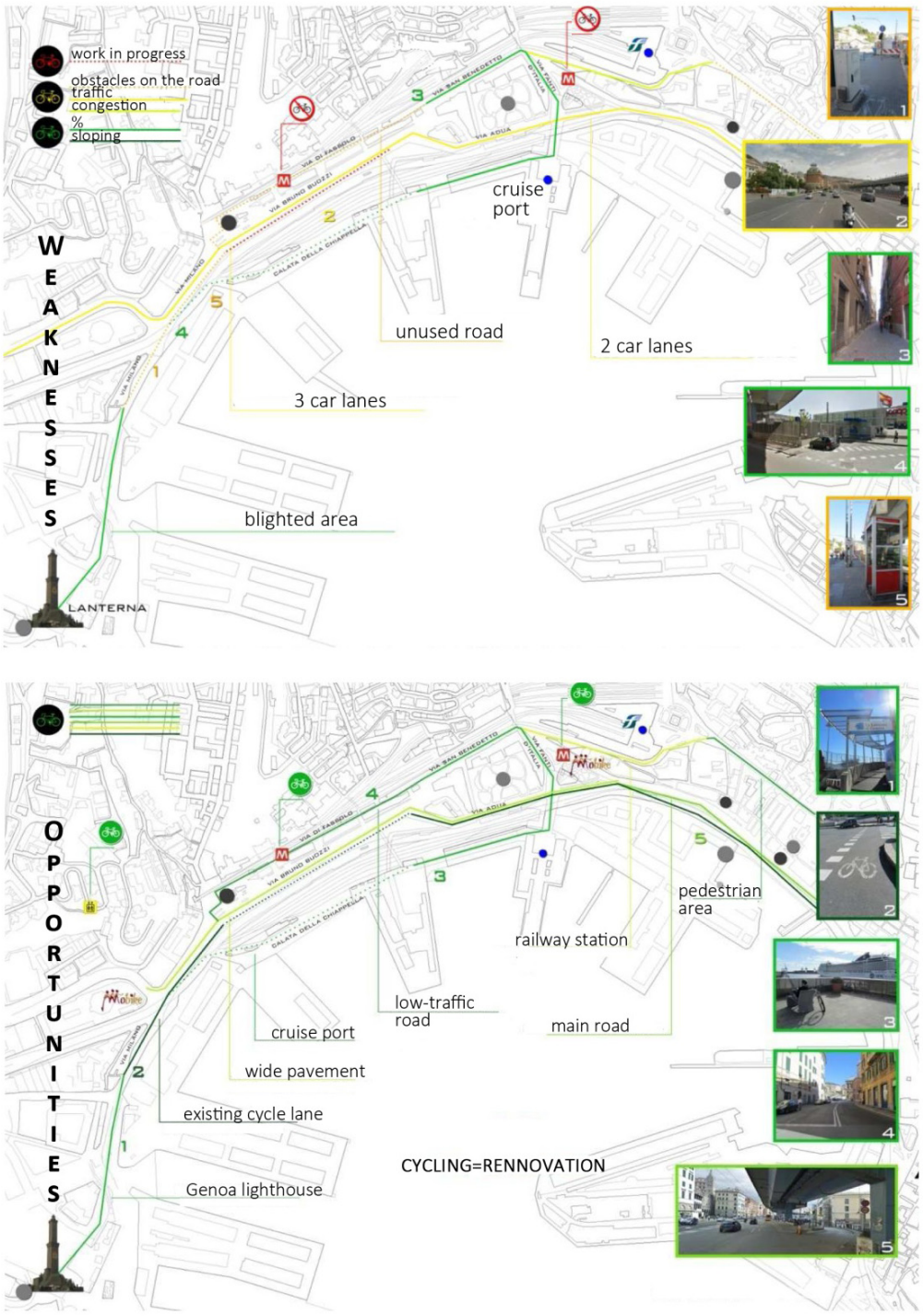


Figure 5 – Cycling inside Genoa old town: Master plan. First project proposal.

public investment could be reached. It's essential to integrate cycling policies with other policies addressing land use, environment and business. These policies have also to be coherent; this requires co-ordination among various levels of government and sectors, with input from cycling stakeholders – including national, regional and local governmental bodies, non-governmental organizations, cycling associations and the bicycle manufacturing industry. Regional and local Authorities are responsible for detailed cycling implementation plans; national Authorities commitment is essential in setting the best legal and financial framework to guarantee successful cycling initiatives. Unfortunately even if cycling can have many advantages cycling remains somewhat marginal in transport policy discussions in many Countries and national budgetary allocation reflects this status.

- Cycling Culture: Cycling policies and measures alone cannot assure the use of bicycles for urban travels. Bicycle use varies from city to city. While more than 50% of all trips are made by bicycle in some cities, cycling as a means of travel is almost non-existent in others. Behind these variations lie dif-



Figures 6-7 – Cycling as renovation: weaknesses, opportunities. Second project proposal.

ferent factors relating to the economy, topology, climate and culture. But it's this last category to really influence cycling because it's possible to see people cycling in country with really adverse weather condition as Denmark and cycling could be equally diffuse in poor or rich countries. Of primary importance it's to establish a culture which favors the increased use of bicycles for all age groups promoting cycling as an healthy way to travel. The UK National Cycling Strategy explicitly refers to Culture shift - changing attitudes. The aim of this plan is to raise the status and awareness of cycling amongst transport providers, service providers and employers as well as potential cyclists and other road users. To do that a specific communication programme has been set. This culture shift wants to spread the message that cycling is a practical, safe and enjoyable form of daily transport and the communication program has to generate a culture change for cycling. After few years from the UK National Strategy adoption more and more people use their bicycles, especially for local trips. Moreover different investment in cycling infrastructures provided safer conditions on the road and a critical mass of cyclists was

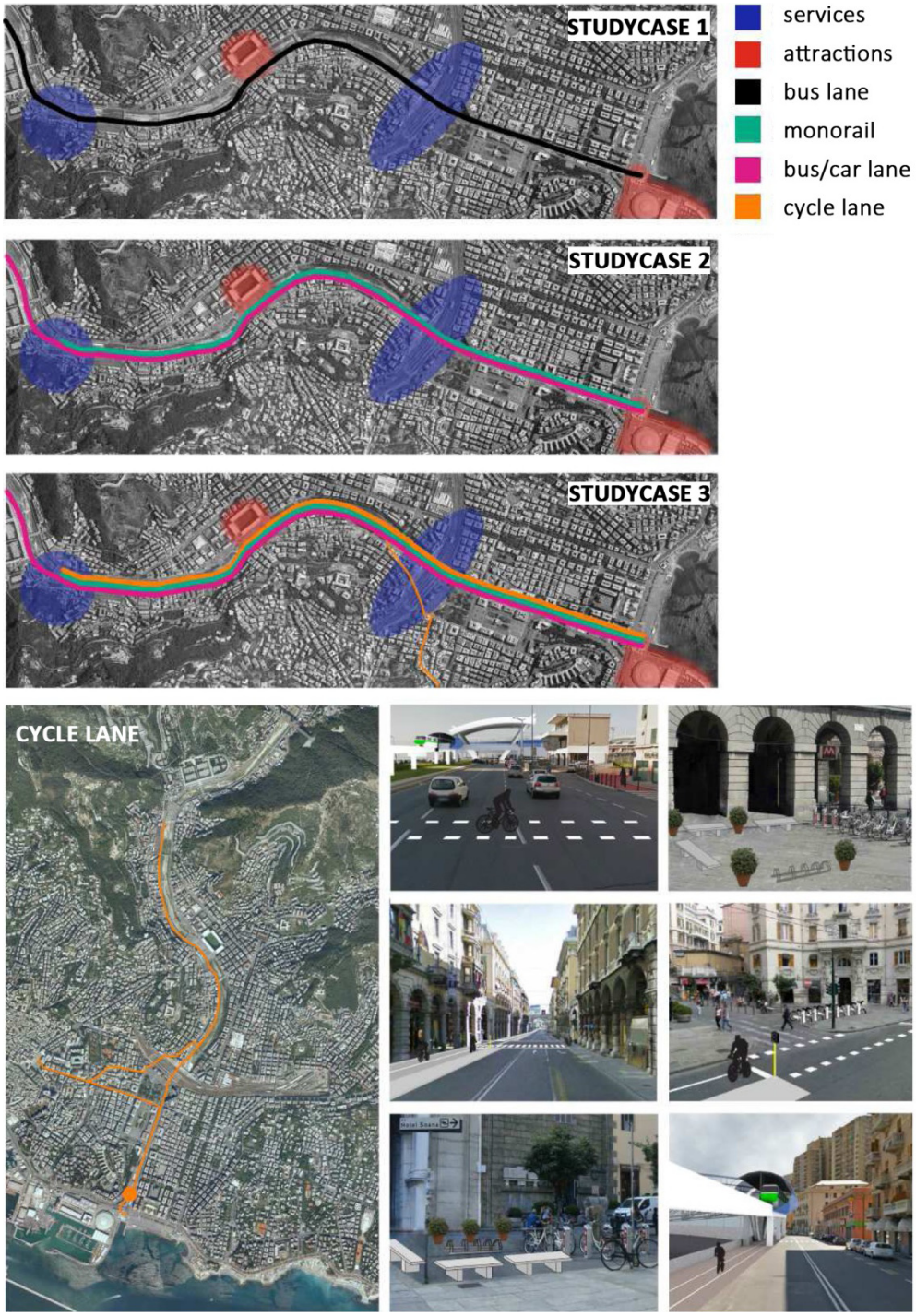


Figure 8-9 – Monorail and cycle path: study cases and rendering. Third project proposal.

encouraged. Then cycling feeds on its success making streets safer and cleaner for everyone.

There are real and perceived barriers that obstacle urban cycling – with the exception of a few countries –. Real barriers are caused by the lack of infrastructures and so by the absence of a good cycling policy; perceived barriers depend on the presence or not of a widespread cycling culture. Local Authorities have to be aware about the key factors above mentioned when they decide to boost cycling as a daily way of transport. These recommendations are also fundamental to do a correct Sustainable Urban Mobility Plan where cycling have to be considered as well as the other mean of transport becoming an essential element for urban development and renovation.

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