

# From Felsina to Bologna: Historical Development and Temporal Design

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At the end of 1st century B.C. Vitruvius wrote: "The architect should be equipped with knowledge of many branches of study and varied kinds of learning, .. This knowledge is the child of practice and theory." While attaining in 2005 the 2th ISTD, the Author was asked to present some ideas at Kokubu Civic Center, where a new municipality was rising in these days: having in mind both Vitruvius' books and Temporal Design theory, I exposed my view on this subject. Here the historical development of Felsina, the ancient Villanovan settlement, up to the actual urban organization of Bologna metropolitan town is analyzed. In this process, some aspects of Temporal Design in architecture will be picked up: among them, the correspondence with Ando's three ages of human life, as I foresaw for Kukubu Municipality.

**Keywords:** Temporal design, Urban development.

## 1. INTRODUCTION

Nature gives us an environment that is not always pleasant at our senses: not only sun, green, flowers, some water, but also hot, cold, storm, and so on. So we must modify our environment to the best of our possibilities to reach satisfactory living conditions.

About two thousand years ago Vitruvius wrote that this must be the job of an architect, adding that its work must be «the child of practice and theory» [1].

During time elapsed, the scientific knowledge has grown up to actual level giving a scientific basis to the theory of that time. In particular, computers changed the logic of many kinds of measurement instruments and gave new opportunities to a deepest investigation of our mind, so opening the way to Prof. Ando's studies in the field of audio perception and sound preference, a relevant contribution to the work of architects involved in design of Auditoriums and Opera Houses.

17 years ago Prof. Ando was visiting Italy and, during a private meeting in Rimini, he exposed me his idea to extend the concept of individual preference to all human senses in favor of a better based architectural design in general. His new broad ingenious thought was very attractive and involved me in a personal investigation about the possibility of integration of this discipline in the European architectural projecting way not only in the design of inner spaces, like in Theatres, but also in urban contexts.

In western vision of Architecture we still follow the original formulation of Vitruvius books, even if many things have changed due to long time elapsed, but the target is always the same: buildings must be aimed to the achievement of

**global comfort**, satisfying all human senses from seeing to hearing, smell and taste, warm and cold, avoiding any mechanical injuries [2].

We cannot verify the achievement of this goal only with individual sensations, but we need to explore the behaviour of the mean human brain and get general rules for architectural design, so exceeding the usual building quality standards [3]: this can be made now with modern techniques, associated to results of instrumental measurements as is, for instance, for the noise standards or for preference in theatres, or temperature and humidity in the closed environment.

In his recent book [4] on Temporal Design, Prof. Ando tries to joint subjective preference to mean values, having in mind that humans are subjected to changes during their life, that is to say his three stages of life, so implicitly requesting the Architect to take into account, while conceiving his design, also of this relevant aspect.

In this paper we will analyze a particular environment, that is the towns' urban texture: this will be made on the basis of a short analysis of the development in time of a real context, that is Bologna [5, 6, 7, 8, 9], the town where the 8 ISTD treated its sessions, but it could be made for many other Italian towns.

## 2. THE ESTABLISHMENT OF FELSINA

Following for instance [5, 6], human settlement on the land we are dealing with began when the ancestors of Villanovian people, at the age of bronze discovery (X-IX B.C.), abandoned the lower slopes of the Apennines and began to build their straw' dwellings in the western side of the actual town of Bologna.



Fig.1. An actual copy of a Villanovian hut (IX-VI B.C.)



Fig. 2. A sarcophagus and some remains of an Etruscan cemetery found in Queen Margherita Gardens in Bologna

Soon after, a similar process happened in the east side, as testified from archeological findings of Villanovian culture: later on, the Etruscan people expanded from Tuscany towards North Italy and occupied the Villanovian's territory.

Their dwellings were made by a wooden structure covered with straw: some years ago a didactic Villanovian hut was erected in the main city gardens (Fig. 1) where many years ago an Etruscan cemetery (IV-VI B.C.) and a big sarcophagus in travertine stone were found (Fig. 2).

The valley in which Bologna is placed (Fig. 3) is characterized by the biggest river flowing in Italy, the Po river, crossing from West to East the homonymous valley and flowing into the Adriatic sea; near Bologna flows another Adriatic tributary, called Reno, of which all the channels represented in Fig. 4 are either derived or tributary: these are the waterways from Felsina to Adriatic sea, in use till the XIX century, as tested in some ancient post card and from the name of some ancient roads – for instance “Harbour street” and “lock District”. Between those primary lowlander's settlements, in the place where the actual Bologna town center is settled, some water streams were flowing. Now almost all of them are covered, even for sanitary reasons, but in a map about one hundred years old they are clearly represented (Fig. 4): some very short spots are still visible (Fig. 5), while some others flow under earth and are in use to produce electric energy.

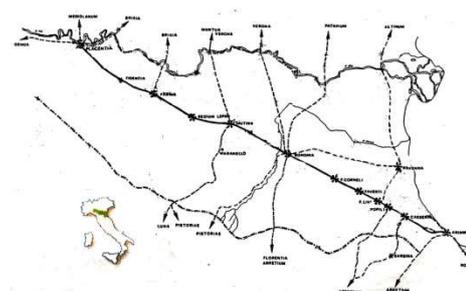


Fig 3. The location of Bononia within Italy, showing: Po valley, Po river (north side), Reno river (from sources to mouth), Adriatic sea (east side); watershed of local Apennines' mountains (south side)

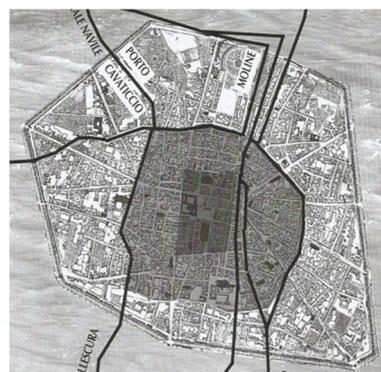


Fig. 4. Water streams flowing under the actual Bologna town



Fig. 5. A spot of water channel still visible: on the right side it is visible a little cove where animals were brought to wash and drink

To find a source of drinkable water, people moved towards them and began to organize activities taking also advantage from this source of energy that, at the same time, became an useful way to reach other villages and the Adriatic sea.

Very briefly, these are the historical origins of the former Etruscan settlement of Felsina.

### 3. THE ROMAN PERIOD

Till VI century B.C. Felsina grew as working and cultural center, becoming also the capital of Etruria in Po river valley; the Reno river became a relevant trading way, as testified from findings of sailboats along the river and near the sea (for instance, Spina: an harbor frequented also by Greek sailors).

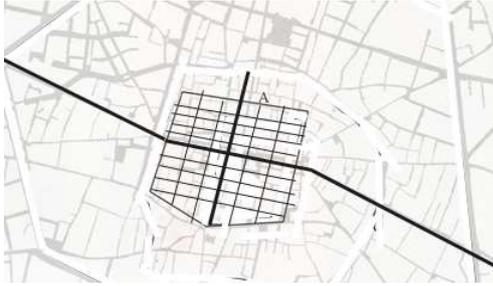


Fig. 6. The Roman network and the Via Aemilia

During the IV century B.C., “Galli Boi”, a warrior people coming from actual France, began to populate the town, whose name changed in the Celtic Bona.

In 189 B.C. Romans established here a colony that took the name of Bononia.

Romans settled down the typical network of perpendicular roads, that still characterizes the middle of the town, and connected the decumanus maximum to the Via Aemilia (Fig. 6), very relevant for the local economy as fundamental connection to the Adriatic sea and the north-west of Europe (Fig. 3).

Still now the layout of Consular roads like the Aemilia is fundamental for the exchange of goods between the Adriatic sea and the North of Europe by cars and now is bordered also from modern motorways and high speed trains: we can say that the location of Bononia on this road acted and still act as a spring for the economic development of the town.

The relevance of Bononia for the Roman economy is put in evidence, for instance, from this event: in 53 A.D. the emperor Nero supported the reconstruction of the East side of the city, destroyed by a furious fire.

In his honor, the first stone-made theatre in the empire was erected soon after in Bononia, enriched by a big statue representing a Roman emperor, may be Nero himself, now exposed in the local Archeological Museum.

Quite completely destroyed during the middle age in the development of the town, its shape is still visible (Fig. 7).

The remains of the theatre and the central part of this statue were found in 1977 [10] during the refurbishment of a clothing magazine and are now kept within a building.

Due to the crisis of the Roman Empire, the town took the actual name and in the V-VI A.D. a defensive wall was erected in selenite, a local gypsum variety, in defense of the town, whose extension was so reduced as a consistent portion of people abandoned Bologna (Fig. 8).

In the following centuries, this wall was completely destroyed, the stones were utilized in new buildings and only



Fig. 7. The remains of the Roman theatre in Bononia.

some remains are now visible in the foundations of the Lombard imperial palace, completely destroyed at the beginning of XII A.D.

#### 4. THE MIDDLE AGES.

After many war events, characterized by the fight among Goths, Byzantines and Lombards, Franks took power and Charles the Great offered the town to the Catholic Church (774 A.D.): it was the beginning of a long period of a more or less hidden influence of the Church of Rome on the life of Bologna up to the Italian unification.

In particular, before the Franks’ invasion Lombards were in fight with Byzantines, coming from Ravenna and the Adriatic sea. So for military reasons they expanded the town out of the selenite wall towards South East, and added a new network of roads, called the Lombard addition, fan shaped (Fig. 8).

This fight period brought many citizens to abandon the town: anyway within the selenite wall some well defended buildings were erected, as residences of the bishop and aristocratic families.

In XI A.D. a period of economic growth started: the citizens’ enterprising spirit favored the formation of tailors’, goldsmiths’, shoemakers’, butchers’ corporations: these activities ensued fundamentals in the future economic development of the town and gave the name to some still existing streets.

Very relevant for the future university birth was the presence of renowned lawyers, among which we can remember Irnerio and his law’ school. It is from this strong presence of schools of Civil and Canonic laws that started the “Alma Mater Studiorum” (1088 A.D.) and one of the nicknames of Bologna became “The Learned”.

The growth of the town accounted for an enlargement, so a new wall was erected at the end of XI A.D., including the former roman town and the selenite wall: the entry to the town

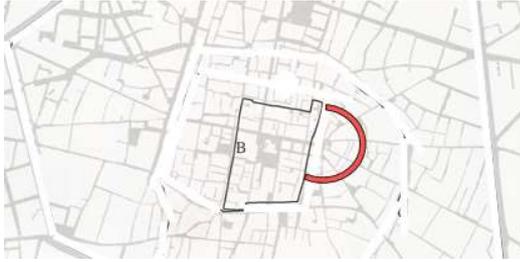


Fig. 8. The selenite wall and, in red, the Lombard addition



Fig. 9 - A well preserved Torresotto, still in use as private residence

were characterized by inhabited towers, called “Torresotti”, still visible even if now compelled between buildings that took the place of this wall (Fig. 9).

At the beginning of the XII A.D. the representative of the emperor died and citizens took the opportunity for a rebellion: the middle of the town was destroyed again and a new public governance with a certain political independence, said “Comune”, was established, as in many other Italian towns.

Between the end of XII and XIV A.D., one of the relevant architectural aspects of the town were the towers that important families built as a defensive device, but also to assess their power, represented by their height (Fig. 10). Also the most famous tower, the «Asinelli», whose name comes from that of a rich local family, was built in this period.

With the growing relevance of the public power, many private towers were limited in height while, due to its height (60 meters), the Asinelli was selected as civic tower and raised to the actual value of 100 meters (Fig. 11). In this period all the existing buildings were covered with a clay element similar to the tiles used by Romans, the “coppo Bolognese”, made with cooked earth, giving to the town a typical color, strengthened by the unique use of the same clay to build houses and palaces, due to the lack of marble: the town was so called “The Red”, as clearly visible in Figs 5 and 9. At the end of

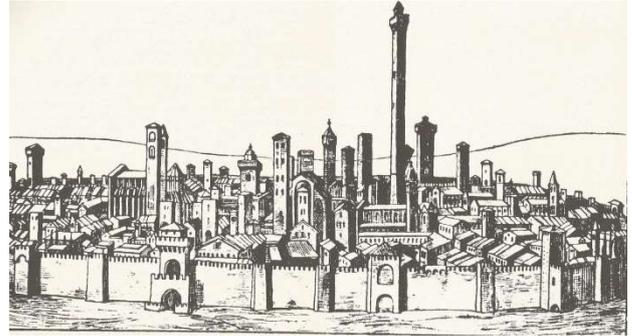


Fig. 10. An ancient drawing representing Bologna and its towers

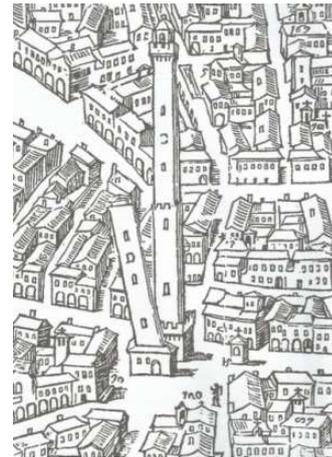


Fig. 11. The Asinelli tower, represented in an ancient drawing in the town texture of that time; the erection of its adjacent, Garisenda, was stopped in progress due to a land sinking

XII A.D., the growing of the town asked for more land and a new defensive wall was erected (black line in Fig. 12).

At the beginning of XX A.D., these walls did not represented any more a valid defensive mean, but on the opposite side they prevented the urbanization of the surrounding countryside (even called “contado” in a disparaging way): so the municipality decided their demolition, leaving only the “gates”, still visible (Figs 13 and 19).

A unique character of the urban building style of that time, still widely in use for modern edification, is private, covered spaces for public utilization: the porticoes (portici). Space problems are the starting point of this local peculiarity: to increase inside flats’ dimensions people began to extend them upon the road, the upper facades coming more and more closer (Fig. 14).

So, at the end of XII A.D. the municipality decided to compel every new building maker to realize, in front of the road a public, covered space, whose height ought to be at least that of a riding man (Fig. 15).



Fig.12. The selenite (in blue) wall with the Lombard addition, the medieval one (in red) and the more recent (black) wall



Fig.13. One of the gates with the residual presence of the wall



Fig. 14. The problem that gave origin to the “Portici”



Fig. 15. An ancient “portico”

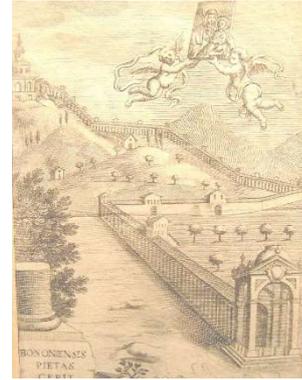


Fig. 16. A pictorial view of the full “portico di San Luca” [11]

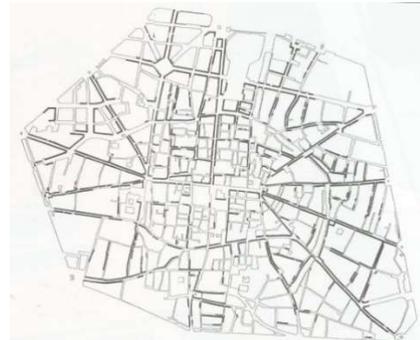


Fig. 17. A map with the actual presence of “portici” [12]



Fig. 18. A wall picture “tromp-l’oeil” within a mansion

The most famous «portico» was built as a shelter for people going in procession with the portrait of lord’s mother between its shrine and the town (Fig. 16); this structure is more than 3,5 km long!

Actually the urban network of «portici» is about 38 km long (Fig. 17). Through the following centuries Bologna gradually expanded.

The richest citizens became owners of portions of land short in front of the internal network of roads but extended in depth, so the new aristocratic mansions were built with little internal courtyards and gardens: Bologna becomes a town with many private internal gardens: where the space available was very limited, their walls were painted so to look larger (Fig. 18).

## 5. CONTEMPORARY AGE

Major changes in the town architectural organization occurred after the unification of Italy up to the First World War: many old little buildings, hovels, patrician towers and even the walls were destroyed to give space to main streets, the double ring, squares and public gardens (Fig. 19).

As we have seen, Bologna economy and building practice started around some channels crossing the site; many industrial activities (like silk spinning mills, corn mills, dye works and so on, even a well-known professional mechanical school!) flowered with the energy of water up to the beginning of XX A.D.. In Bologna there was also an harbor, documented in some ancient pictures, for instance one of them suggested to a contemporary artist the drawing represented in Fig. 20.

As already said, they are now quite all covered even for sanitary reasons, giving space to the rise of vehicular traffic, that now heavily interferes with our life polluting our environment with noise and chemical injurious substances!

Now the town has reached a satisfactory level as urban architecture is concerned, but many new problems are troubling our life: on tires internal transports of citizens, goods and foodstuffs, security within gardens and homes, drug trafficking even in the best squares and corners, air pollution in general.

Another relevant aspect of today level of life is related to heat pollution, common aspect of quite all European ancient town, not only in Italy. Ancient buildings were erected following only structural reasons, without any precautionary measures against leak of heat in winter and heat coming inside in summer that now call for heating in winter and air conditioning in summer. Furthermore, we have seen that in Bologna 'The Red' buildings are chiefly made in masonry at sight, so external walls thermal insulation is quite impossible.

From this situation two consequences are deriving: the first of them is the uncontrolled waste of thermal energy towards the environment both directly in winter and indirectly in summer from condensing refrigerating machines, so external temperature rises and its increase is more evident in compact towns like Bologna, and this is the second consequence that worsen the situation in summer!



Fig. 19. Some remains of the Middle Age Walls

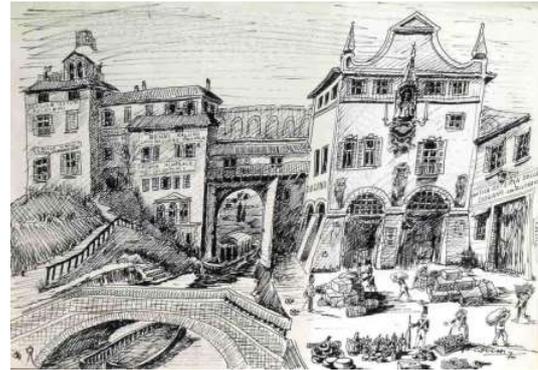


Fig. 20. The ancient harbor of Bologna, in a drawing by M. Cocchi (1905-1993)

## 6. DISCUSSION.

Preference can be tested directly following prof. Ando's leading ideas: but it seems hard to think of individual tests when people concerned are too much as for instance in a town quarter. Looking at Bologna development we have seen that many modifications of the architecture of the town were determined either by the natural course of the events or politically forced without any «preference» directly expressed from the inhabitants:

- the availability of a new harder metal for weapons allowed people to abandon hills and occupy the more fruitful valley;
- the call from water flows made easy to collect in a community to work together; the opportunity of a common civil organization brought to a planned land distribution;
- walls of different size were erected to defend citizens from invaders, while towers were utilized also for internal struggles;
- to get more space between houses and protect public spaces with private charge, a big system of «portici» was created along the streets;
- during the last two centuries the network of channels was overlapped and main streets enlarged;
- at the beginning of the last century many little houses, many towers and the more recent walls were destroyed to give space for new large roads, streets and public gardens.

But we can recognize in these changes a close relation to the way of thinking of Ando's three stages of life.

This can be made looking into two different perspectives. In [13] Burgess stated an urban organization, based on sociological reasons, recognizing six concentric areas, taking into account not only the close periphery of the town, as in this work, but also the far commuter zone: many towns in Italy, and in others European countries, are now taking an administrative organization (now called "Provincia" and in future "Metropolitan area"), that takes into consideration an area much wider than that involved in ancient settlements like Bononia: this work doesn't take into consideration the aging of the inhabitants, origin of Ando's considerations on Temporal Design.

Instead, in 2005 in Kokubu, where a new municipality was rising in these days [14], in the line of temporal design I proposed, as a broad outline, an urban organization with three concentric areas (Fig. 21).

The central one, quiet, to be utilized chiefly for cultural activities and soft entertainments, where ancient people already retired from work can live their third stage of life free from noise.

The intermediate one, night-time quiet, where babies come into the world, grow in body and mind, and spend a certain lot of time chiefly in intellectual work in schools and universities: first and second stage of life.

The external one will instead be devoted to essential activities, transport means, industrial works, as well as amusing and noisy activities: the most active part of second stage of life.

The aim of this work is to put in evidence the fundamental role played in the last about a hundred years by the aging of the inhabitants. In a broad sense we can recognize in Bologna a changing process, where the land within the ancient gates' ring will be, slowly but unavoidably for economical and practical reasons, abandoned from young active people: particularly in night period, when the financial life stops, in its interior still only ancient people and cultural activities like Opera performances and Concerts of classical music remain: the third stage of life.

Primary schools are scattered in all territory, while secondary schools and University chiefly remain within the gate' ring: obviously, night-time educational activities stop.

As said before for Kokubu, industrial and noisy amusement activities are settled in the far periphery.

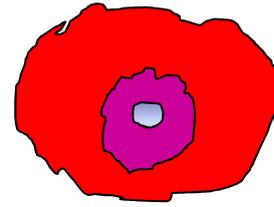


Fig. 21. A schematic view of a possible organization as presented in Kokubu.

A more relevant aspect can be found casting the historical development of Bologna at planetary level, and we cannot forget it.

We have put in evidence that the first 2000 years were characterized by continuous fickleness, as the first stage of life of many humans is.

During the following 500 years we found the flourish of industrial activities based on waste of primary energy resources: water flows, coal, then, oil and gas combustion. Even the Second World War, that caused destruction and death, must be included in this period, as a big spring for scientific development: for instance, nuclear energy and computers are sons of that terrible period!

The post second world war reconstruction work and the occidental humanity aging, while our environment is troubled from pollution, waste of water and primary energy resource, are now concluding the second stage of life of our planet?

Going on in such a way, really like a human in the third stage of life, our planet will perish!

## 7. CONCLUDING REMARKS

We need to avoid this, humans must collect together and recognize that during the second age and the industrial revolution in particular, our ancestors made many useful innovations but also many mistakes against nature. The new informatics means can now open a way, reducing energy consumption, favoring work at home so reducing drastically traffic on tires, getting more agreeable public transport means and traffic of goods on rail.

In Bologna, but even in many other towns in Italy, after the Second World War started a movement of people, (chiefly peasants) toward the periphery of the town, giving rise to districts whose big buildings are lacking of any kind of thermal insulation devices. Now, due to the development of informatics means, as said before, but also for economic reasons, chiefly younger people search for new and more agreeable homes far from the ancient town [15].

New buildings must be conceived to save any possible kind of energy, to preserve inhabitants from noise pollution, to

increase the use of solar light out of any damages for our eyesight apparatus, in short a life with nature but avoiding damages from and to the nature itself.

This will be the goal of temporal design, at an extensive scale, able to drive humanity toward more sustainable choices!

## REFERENCES

- [1] Vitruvius M.P.(about 15 B.C.). De Architectura, Liber I, Caput 1.
- [2] Cocchi A. Ando, Y.(2009).Global Comfort: The Occidental View of Temporal Design. J. Temporal Des. Arch. Environ., 9, 1, 80-84.
- [3] European Commission (2011). Manual of Standard Building Specification. Office for Infrastructures and Logistics. Brussels.
- [4] Ando, Y. (2016). Brain Grounded Theory of Temporal and Spatial Design in Architecture and the Environment- Springer Japan, Tokio. . DOI: 10.1007/978-4-431-55891-0.
- [5] Fasoli G. (1975). Profilo storico dall'VIII al XV secolo. Storia della Emilia Romagna, Vol. I, 365-404, (A. Berselli Ed.). University Press Bologna.
- [6] Bocchi F. (1975). Le città emiliane nel medioevo. Storia della Emilia Romagna, Vol. I, 405-434, (A. Berselli Ed.). University Press Bologna.
- [7] Bottino F., Scannavini R., Cervellati P.L. (1970). Lo sviluppo urbano di Bologna dalle origini ad oggi. Bologna, Centro Storico. (Cervellati P.L. et al. Ed.) ALFA, Bologna.
- [8] Clemente F., Fasoli G., Orlandelli G., Rossi G., Susini G. (1974). From the Beginnings to the XIX Century. Rassegna storica dell'insediamento (Università degli studi di Bologna ed.) Labanti e Nanni, Bologna.
- [9] Bonazzi G.(1989). Bologna nella storia. Zanichelli . Bologna.
- [10] Ortalli J.,Baldoni G.(1986). Il teatro romano di Bologna. Proc. Dep. Storia patria. Emilia Romagna.
- [11] Gamberini P.L.(2014). L'iconografia del portico di San Luca tra il Seicento e il Novecento. InArCos Bologna, 2, LXIX.75-84.
- [12] Bocchi F., Smurra R. (2014). Genesi e sviluppo dei portici di Bologna nel medioevo . InArCos Bologna, 2, LXIX.10-20.
- [13] Burgess E.W., McKenzie R.D., Park R.E. (1925). The City. University of Chicago Press.
- [14] Ando Y. (2006). Foreword to the Special Column of the "Renaissance Conference". J. Temporal Design Arch. Environ. 6, 2, 57-58.
- [15] Gambirasio G., Guiducci R., La Pietra U., Menghi R. (1990). Da periferie a città. Ist. Ed. Universitario Cisalpino. Milano