Past, present and future of the forgotten places in the ancient “Ospedale Maggiore” (Ca’ Granda) in Milan. Studies, surveys, analysis, prospects and projects
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1. Foreword
The following pages tell about a ten years long inter-disciplinary campaign of surveys, researches and analysis focused on the buildings of the historical Archive and the church of SS. Annunciata in the Ospedale Maggiore in Milan, dubbed from the milanese the Ca’ Granda. The campaign was urgently appointed in 2002 by the Cultural Heritage Service of the Fondazione IRCCS Ca’ Granda Ospedale Maggiore Policlinico, as a consequence of the worrisome structural conditions, the clear suffering signals displayed by the places and the severe environmental conditions. Moreover it had to be taken into consideration the vulnerability of the valuable multimaterial cultural heritage (manuscripts, paintings, wood libraries, sculptures etc.) that has been hosted here for centuries.

The rare disposal of financial resources and time made it possible to improve and to refine through the years the steps, the methods, the tools, and the goals themselves, given the priority to the going on of the original and historical function inside the places. It should be stressed that despite the well known importance of the places, as far as the history of architecture and of restoration are concerned, the progress of the researches and the multidisciplinary approach led to a true rediscovery of the identity, the role, the specific history, the material features and the artistic arrangement of some hidden and forgotten places of the Ca’ Granda, such as the crypt and the suplchres below the church of S. Maria Annunciata.

It was possible to set up and coordinate a well cooperative team that has followed the different steps of the work, including the researches on the archivial sources, the geometrical survey, the stratigraphic survey, the detailed description of the existing features and conditions, done room by room, and a broad campaign of di-agnostic tests and analysis on the structures, on the materials and on the microclimate. A thorough knowledge was gradually increased during the years, thanks to the disposal of new resources, with the primary aim to permit a well planned program of interventions for the maintenance and for the conservation of these once forgotten places, giving the priority to the strengthening of structures.

2. Releasing a glorious past from a recent forgetfulness
Since its foundation, the “Ospedale Maggiore” has always been one of the main “monuments” of Milan, well known for its architectural features which perfectly matched the most in the vanguard criteria of efficiency in the care and treatment of those in need, as the main guides to the city of Milan demonstrate through the centuries. Its peculiar plan - with two “crociere” that flank a large courtyard - became a model and gained the role of a prototype, de-
scribed in the most important treatises on architecture and proposed again in other hospitals around Europe\textsuperscript{1}. The functionality of the Ospedale’s plan has even overcome the complex events of the construction, which, since 1456, took almost four centuries, following the main issues of Filarete’s “original” idea.

Our interest has been focused on some specific buildings: the Archive, once the monumental Capitolo d’Estate and the smaller Capitolo d’Inverno - where the hospital’s administrators used to gather until 1796 - and the adjoining places, together with the church of the SS. Annunciata. These buildings belong to the second phase of the hospital’s construction, which took place from the end of the 1620’s for over twenty years, thanks to the generosity of Giovanni Pietro Carcano, who made it possible to build the main central courtyard and the corresponding buildings along the Naviglio, according to the plan of Francesco Maria Richini\textsuperscript{2}.

The sale capitolari and the church were actually the most representative places of the hospital, in a time when architecture was strictly connected to the ceremonial’s requests, as their location in respect to the whole complex and the layout of the walks-through clearly show. The quality of the architecture is disclosed by its constructive and ornamental features as well, together with the magnificent fixed furniture that have enriched these places, such as the XVIIth Century valuable oak shelving of the Capitolo d’Inverno.

Even more, what actually characterizes these places is the continuation through time of their functional destination, so that the various adjustments – made especially between the XVIIIth and the XIXth Centuries – are the consequence of the need to go along with the progressive increasing of the archive heritage and the recurring changes in the organization of the hospital’s administrative
functions. The Church has undergone interventions related to its peculiar function, such as the addition of the apse in the middle of the XIXth Century, the new decorations between XIXth and XXth Centuries, and the adjustment of the crypt - which, since its foundation in the 1630's, for less than half a century, was the cemetery of the hospital -, as the shrine of the fallen during the 1848 battles of the Cinque Giornate of Milan.

Until the beginning of the XXth Century the role of the Archive and of the Church was unaltered, actually enhanced, for example, by the studies and the reorganization promoted by the archivist and historian Pio Pecchiai.

Afterwords, the destiny of the Ospedale was determined by the tragic consequences of the bombings that took place in 1942 and 1943. While most part of the Ca' Granda was assigned to the Università degli Studi, giving the opportunity for one of the most cultured and praised post war intervention of re-use and restoration - thanks to a composite professional team, under the guide of Ambrogio Annoni first and of his scholar Liliana Grassi later -, the buildings left to the Ospedale Maggiore as the headquarters of the administration and the parish church of the hospital, underwent quite a different destiny.

The intricated border line between the Ospedale and the Università clearly shows how factitious the separation between the two parts was, while the reinforced concrete structures that violently cut the ancient brick masonry in the crypt and in the attic, mark a final physical detachment.

The Archive and its adjacent rooms, slightly damaged by the bombings, were progressively “forgotten” and marginalized in a sort of boundary area, with separated entrance on the back of the building. Post war interventions were made on the timber roofs, while the great vault of the Capitolo d'Estate, decorated by the painter Pietro Antonio de Maestri (called Volpino) in 1637, illustrating rare iconographic subjects related to the Holy Mary, was left mutilated and weakened, with the central area of the plaster pulled down as it was unsound. The Church, whose narthex was totally destroyed by the bombings, underwent a restoration intervention which turned the once richly decorated places in a simple geometric, “neutral” appearance, lost its predominant role,
and was left for the fearful prayers of the students before the exams. The underneath crypt was used just as a lost deposit, and it gradually fell in abandonment conditions.

As far as the Archive is concerned, the worsening of the places conditions, more and more inadequate both for the office requirements (it is still a “living” archive) and for the opening to the public, led to the their inaccessibility, and were gradually taken away from the scholars and, inevitably, from the memory of the city.

At the same time, the prosecution of the archive function has led to sporadic and sometimes inappropriate works of maintenance and refurbishment, such as the interventions made to adapt the upper rooms on the Capitolo d’Inverno to be used as offices.

3. Getting to know a rich and complex present
Since 2002 a renewed interest by the Cultural Heritage Service of the Fondazione, oriented primarily to the safeness and the conservation of both the “contents” and the “container”, which are closely related, and aimed at the prosecution and valorization of the activities of the Archive itself, has made it possible to set forth to an articulated knowledge phase. This has been conceived since the beginning as a base for every future choice, both in terms of prevention for the ongoing functions and for the planning of maintenance and restoration interventions.

First of all it must be taken into consideration the extraordinary reachness of the Hospital’s cultural heritage, which is extremely meaningful not just for the history of health assistance and care in Lombardy during the last millenium, but for social, art, economy, and landscape history as well. In effect the Hospital’s heritage gathers different but strictly connected collections: the precious historical archive, the celebrated collection of the benefactors portraits (a tradition that began in 1602 and is still living), the photographic archive, more than 100.000 volumes of the historic medicine library, the historic medical and surgical equipment collection, the majolica apothecary vases, etc. In particular, what makes this cultural heritage unique and extraordinary is the contiguity of the different collections inside the building itself, and the possibility of studying and understanding them alltogether, drawing the attention of scholars specialized in the different historical fields.

So, since the first surveys we were strucked by the complexity of the places, amplified by the contrast between the anonymous image given on the outside by the facades along via Francesco Sforza (corresponding to the flow of the ancient Naviglio, covered in 1929), characterized by plasters and interventions made during the 1960’s, and the abundance of solicitation offered from the inside, where the sedimentation of furnitures, objects, works of art and so on, was left intact, and still clearly testifies the long life of these places, where nothing, neither the absence nor the inadequacy of the recent maintenance interventions, could diminish the high dignity of the architecture.

The suffering of the structures and of the finishes was firstly denounced by the evidence of the structural vulnerability, by the large lacuna in the vault of the Capitolo d’Estate, by the deformations of the brackets which are part of the
wood shelving built in 1808 along its walls, by the wear and tear of the original floors and of those of the beginning of the XXth Century, by the plasters deterioration chiefly caused by moisture. Furthermore it emerged the chaotic net of the systems, whose paths weren’t documented at all and that could be just in part surveyed.

Moreover, walking through the different rooms it was also possible to perceive the microclimatic conditions as one of the main risk factors for the cultural heritage hedged in, mainly for the precious documents. Therefore it was displayed quite a worrying picture of the places’ general conditions, which, in primis, had to be discerned in order to allow an effective analytic process.

3.1. Studies, surveys and diagnosis campaign: questions and steps

3.1.1 The Archive (2002-2008)

The systematic features of the Ospedale’s cultural heritage, heterogeneous by matter, and the suffering conditions of the places themselves, the awareness of the overlapping of different risk and vulnerability factors demanded a gradual cognitive approach, through a step by step directing and deepening of the knowledge.

The urgency conditions requested to acquire data on the places’ consistency and conditions that could made it possible to recognize the critical situations in terms of safeness and to identify the processes, the causes and the extent of decay. This, having to guarantee the absence of interruptions in the Archive activities and having no basic documentation at all, beginning with the simple boundary delimitation of the places.

The Office’s availability has made it possible to plan the different phases counting on large enough time resources, and to gradually refine the scheduling of the studies and of the analysis, so that it was even possible the backwards check of the data that had been acquired.

The first phase was concentrated on the reconstruction both of the building and reform events and of the usage layouts through time, on the precise examination of the building features, done place by place, handcraft by handcraft, on the recording of the signs of the structural weakness and of the materials’
The 3D Finite Element Model of the church of the An-nunciata and of its adjoining places

suffering.

Moreover, the rare chance to freely consult the documents inside the place that is being studied itself, and to immediately verify their contents through the direct observation of the buildings, has made it possible to pre-cisely follow the “life” of the buildings, even in the apparently less meaningfull facts, and to record on synop-tic plans the sequence of the masonries modifications undertaken through time. This has pointed out meaningfull correspondences with the cracks and deformations survey, facilitating the structural diagnosis, com-mited to Lorenzo Jurina.

The pre-diagnosis report has pointed out the critical cruxes according to which an articulated inter-disciplinary campaign of in-depth instrument analysis was planned, begininnig in 2004. The priority was assigned to a reliable geometrical survey, to the detailed identification of the reinforcement interventions done after World War II, to the acquisition of fundamental data about the features of foundations, masonries, floors and vaults and about the cracks beha-viour through time (thanks to a long time monitoring and to in situ and labora-tory tests), to an accurate survey of the timber roofs (with the identification of the woods species and of the reparations done after the War, the inspection of the defects, the faultiness and of the degradation of the wooden elements, etc.), to the identification of the finishings (beginning with the original XVIIth century plasters, the fresco on the vault of the Capitolo d’Estate, the decor-a-tions hidden by later interventions, etc.), to the accurate survey of the wooden shelvings, even through localized dismantling, to the recording of all the mil-lworks, which were extremely various in type and age.

Part of the analysis were set aside for the check of the environmental condi-tions – in particular the pollution - that affect the conservation of the artistic and documentary heritage, through the chemical, physical and bac-teriolo-gical tests on the indoor and outdoor air, together with the monitoring of the igrotermic conditions of the rooms and of the water and Salts content inside the masoneries.

The greatest attention was given to the evaluation of the structural conditions,
starting with the in situ close observation of the cracks and their survey, and the research of documents dealing with the interventions made in the past; it was possible to make the first hypothesis on the causes of the structural imbalance - which, it was soon clear, began just during the construction site, mainly as a consequence of the particular conditions of the soil related to the foundation system. The diagnosis was improved thanks to the in situ tests: flat-jack tests, the dynamic tests on the ties, the monitoring of the cracks, and the dynamic test on the extrados of the Capitolo d'Estate vault. Thanks to this data, a Finite Element Model was created, through which the real vulnerability of the vault and its structural behavior in case of a seismic event were evaluated.

3.1.2. The Church of the B.V. Annunciata (2009-2011)
In 2009 new funding have permitted to extend the studies to the church of the B.V. Annunciata and on the adjoining places, such as the ancient cemetery below and the upper floors (the "Rettore’s flat"). Again, the goals and the steps were planned on the specificities that came to light during the preliminary phases of inspection and the studying of the archivial papers. Soon two main topics emerged: the intricated history of the crypt and of its cemetery, and the events of the post-war period reconstruction; these interventions were concentrated primarily on the upper floors, and are responsible, for example, for the current appearance of the inside of the church, which is very different from the images given by of the 1930’s photographs.

Here again, the evidence of the structural weaknesses has suggested different types of inspections such as the digs for the foundations survey, the flat-jack tests, and the cracks monitoring, particularly in the large dome of the church and in the vault of the apse, at the crypt level. Video endoscopies were also done to investigate the construction features of the post-war floors. The results were useful for the Numerical Modeling, mainly oriented to estimate the seismic risk. Statigraphical tests were done on the wall surfaces inside the church, to search for the remains of the original decorations and of those of the early Twentieth Century; most of the analysis were done in the crypt and inside the sepulchral rooms: places forgotten long ago, yet of great importance and interest, and deserving of being rediscovered.

4. Giving a chance for the future
4.1. The intervention priorities for the Archive
Since the first phases of our researches, the main goal has been the possibility to obtain the appropriate information to orient priority actions for the safeguard and the care of these buildings. The conditions that had been ascertained, imposed great caution in the usage of the places, even in the absence of imminent structural risks. It was immediately clear the need of an overall assessment, the urgency of an articulated conservation project, that could consider all the main issues: the overriding topics of the functional and distributional reorganization and of the architectural crucial questions (such as the connection between the different floors, the need of new toilets, the layout of the emergency ways, and so on), the structural urgencies in order to reinstate

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the continuity of the structural system and to guarantee anti-seismic security, the taking care of the finishings and the interventions for the preservation of the decorative surfaces and elements, the project for a new wiring and a new microclimate control systems (designed on the features of the different rooms and on the specific type of the cultural heritage inside them), the accurate design of the lighting system and of each new element that will be necessary for the new museographic plan which should consider the increasing of the exhibitions (such as the valuable collection of the benefactors portraits, the Alberti collection, the Aphotecary Museum, the museum of the history of the Ospedale Maggiore, the anatomical-pathology “Mangiagalli” collection, and so on). The Ospedale Maggiore is therefore an excellent study-case, both as an inexhaustible source for the deepening of the knowledge, and for the didactic experiences on the topics of the preservation project, as the workshops attended since 2009 by the students of the Politecnico of Milan clearly show. In conclusion, it’s important to remark that the information acquired offer good basis for the starting of the project procedures, which can not be further delayed: diagnosis are essential, but the value of their results is obviously limited in time.

4.2. First preservation interventions in the ancient cemetery below the Church

The studies, the surveys and the researches done on the church of the B.V. Annunciata have given back to our memory the complex history and the identity of the two levels existing under the church: the crypt (the “scurolo”), that was originally painted with macabre subjects (skeletons and skulls, etc.) by the already mentioned Pietro Antonio de’ Maestri, part of the underground
net of places and walks through, which was fundamental for the hospital’s everyday organization, and the underneath level, the sepolcrum magnum, that is to say the cemetery consisting of fifteen underground rooms, where the deaths were laid from 1637 to the end of the same century. After a long time abandonment some of the seculches were opened again to bury the deads during the revolts of the Cinque Giornate of Milan. In 1860, the central part of crypt received a new architectural and decorative arrangement, becoming the sacred shrine of the fallen, and was connected to the church thanks to two new staircases. At the end of the century the remains were moved to a new monument in Piazza Cinque Giornate, and the crypt was soon abandoned again. The bombings in 1942-43 have partly destroyed the structures below the narthex, and the reconstruction works were accompained by the exploitation of these spaces as a storage and also for the indiscriminate crossing of the wiring and of the heating systems.

At the time of our first inspections, in 2003, the crypt seemed a dark and hostile place, apparently without relations with the rest of the building, full of every kind of objects, where all the surfaces, both walls and the floor, were covered by dust, by the remains of the chalking of plasters and by efflorescences. A suggestive mess that has soon required attention and a painstaking decipherment, starting from the identification of the stone manholes which mark, on the floor, the presence of the burial chambers below. An articulated program of researches was planned, proceeding from the studying of the documents, the stratigraphic survey and the exploration of the sepolcrhal level, having care not to “bother” the human remains. Some analysis were done to know the foundations features, the quality of the different mortars, the sequence and the features of the wall painting layers, the entity and the nature of the processes of decay. All that in relation with the severe microclimate conditions and with an important presence of rising dampness inside the masonries, which were also measured and monitored. Above all, these places gave also the chance to apply the knowledge that had been gained in a first conservation project, carried out between 2012 and
2013, with the priority goal to give appropriate conditions for access and usage, although controlled and limited, both to visitors and to the researchers who will be engaged in the examination of the remains and, moreover, to ensure the best chance of duration to the structures and materials, having care not to delete the delicate and the specific identity of this place.

It was a very cautious intervention, yet well distinguishable: it consisted in the minimum reinforcement interventions, which were necessary to ensure the continuity between the main building and the apse - added in 1852 - and in some punctual interventions for the cleaning and the consolida-tion of the plasters and of the remains of the wall paintings, having the greatest care not to altering the clearness of the stratigraphic evidences. The same interventions were made on the brick-tile pavement, whose lacunae were integrated with a new mortar floor, made using natural hydraulic lime and cocciopesto, suitably developed in situ. A new wiring has been made, completely external to the walls, in which the cables and the lights are hosted in new elements (“totems”) made in steel and copper, expressly designed to emphasize the different nature of the places inside the crypt (the shrine, the places under the narthex and under the porch, the apse). New gates with a sobre design were set in order to suggest the original perimeter of the shrine (where the walls were de-stroyed by the bombings), and to separate the shrine from the adjoin-ing places; a new lapidario in dark brown steel was designed for the exibition of the statues and of the commemorative stones that are stored in the crypt.

The conservative principles has thus led to opt for additions, excluding de-molitions or other invasive actions on the stratified materia of the crypt. The same criteria of caution have suggested to postpone the installation of an air treatment system, for the control of the humidity and of the chemical quality of the indoor; so to consent a longer monitoring of the microclimate, and, as a consequence, a more conscious thinking, in collaboration with experts in the field of the physics applied to the cultural heritage.

Notes

1 The bibliography on the Ospedale Maggiore is conspicuous, the main references might be found in Carlessi M., Kluzer A., 2011, Il cuore dell’antico Ospedale Maggiore di Milano. I luoghi dell’Archivio e la Chiesa della Beata Vergine Annunciata, Silvana Editoriale, Cinisello Balsamo, Milan. The diagnosis campaign was planned and made under the supervision of the Authors; the main laboratories and specialists in charge were: geometrical survey: Prof. V. Ugo, Prof. G. Massari, Politecnico of Milan (2004), CSG Palladio, Vicenza (2010); tests on wood elements: IVALSA, CNR, Sesto Fiorentino, Dr. N. Macchioni (2004); tests on reinforced concrete, Prof. L. Bertolini, Politecnico of Milan (2010); structural diagnosis supervision: Prof. L. Jurina, Politecnico of Milan (2004), Ing. R. Sonzogni (2011); structural tests and analysis: CSG Palladio (2008, 2010); geological studies and tests: dr. N. Bistacchi; stratigraphic tests on wall paint-ings and plas-ters: Cooperativa per il Restauro S.c.a.r.l., Milan (2008, 2010); chemical, biological and mineralogical analysis on mor-tars and plasters: Dr. L. Folli and dr. R. Bugini (2004), Cooperativa per il Restauro S.c.a.r.l. (2010); analysis of the quan-ity of water inside the masonries, and microclimatic monitoring: FiTBeC, Politecnico of Milan, Ing. M. Valentini (2004, 2010-11).

2 Richini, the most famous architect of his age in Milan, thus preserveing Filarete’s
general layout, made meaningfull modifications, enlarging the main courtyard and placing the Church between the courtyard and the Naviglio, with its entrance along the main axis, corresponding, on the opposite side, to the new monumental entrance to the Ospedale.


4 The courses were held by the Authors at the Politecnico di Milano, Scuola di Architettura e Società, and at the post lauream course: Scuola di specializzazione in beni architettonici e il paesaggio, since the academic year 2009-2010.

5 Project: Lussignoli Associati s.r.l. Brescia, with the consulting of the architects M. Carlessi and A. Kluzer, and of the en-gineer Davide Pini for the structural reinforcement. Works superintendence: M. Carlessi, A. Kluzer, D. Pini, with the consulting of the Cooperativa per il Restauro s.c.a.r.l., Milano, for the interventions on the decorative surfaces.

References
AA. VV., 1981, Ca’ Granda, Electa, Milano
Staurenghi C., 1916, L’Ospedale Maggiore di Milano e i suoi antichi sepolcri, particolarmente il Foppone ora detto la Rotonda, Hoepli, Milano