CINZIA MARIA LUISA TALAMO

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Cinzia Maria Luisa Talamo

Curriculum vitae

Milano, 6.5.2016

GENERAL INFORMATION

Cinzia Maria Luisa Talamo,

born in Milan, April the 17th, 1961

1. EDUCATION

Ph.D. in “Technical innovation and design in architecture” at Politecnico di Milano, Ph.D. Dissertation Title: "Project culture and new tools" dealing with the tools supporting the design process in relation to the maintenance phase (1994).

Master Degree (five years program) in Architecture at Politecnico di Milano (degree with honours). Dissertation Title: CAAD and energy conscious design: experiences with personal computer. Supervisor is the Professor Gianni Scudo (1987).

2. PROFESSIONAL CERTIFICATIONS

Passed the government exam and licensed as a professional architect in 1989.

3. CURRENT ACADEMIC POSITION

Full Professor at the ABC Department of Politecnico di Milano, scientific sector ICAR/12 _Tecnologia dell’Architettura (Architecture technology).

4. PAST ACADEMIC AND PROFESSIONAL POSITIONS

2003-2016	Associate Professor (confirmed 2006) at the ABC Department of Politecnico di Milano, scientific sector ICAR/12 _Tecnologia dell’Architettura (Architecture technology).
1998 - 2003	Assistant professor in the scientific sector H09B (Building technology) at the Di.Tec department of Politecnico di Milano.
1995 -1997	Grant holder for a two years postdoctoral research in Politecnico di Milano dealing with the subject of new jobs and competences in the field of planned maintenance.

1994	Grant holder for the development of a one-year research dealing with training in the services for real estate management, financed by CNR (National research centre).
1991 -1994	Ph.D. student in "Technical innovation and design in architecture" engaged in the issues related to the governance of complex projects and the operations and maintenance phase.
1990 - 1991	Laboratory technician at the Laboratory of Information Technologies of PPPE department in Politecnico di Milano.
1987 – 1991	Involved, with different roles, in scientific researches, working in the groups of prof. Guido Nardi, prof. C.Molinari and prof. G.Scudo in Politecnico di Milano, first at the department PPPE (Programmazione, Progettazione e Produzione Edilizia Programming, Design and construction), later named DI.Tec (Industrial Design and Architectural Technology), then BEST (Building & Environment Science & Technology) and, finally, ABC (Architecture, Built environment and Construction engineering).
1987-1991	Consultant for the ANIT (Associazione Nazionale Isolamento Termico _ National Association for Thermal and Acoustic Insulation).

5. RELEVANT CURRENT AND PAST ROLES IN ORGANIZATIONS WITHIN POLITECNICO DI MILANO

Since 1998 she is involved, with different roles and responsibilities, in boards and other structures of the School of Architecture and Society (formerly Faculty of Architecture and Society) dealing with: the planning and management of educational activities, the management of internships (SAT-Internship academic structure), qualification of tutors and temporary teaching positions (didactic commission), the design of specific tracks for the education programmes (the bachelor of science programme in ITEA-Building Engineering and Technology for Architecture, the bachelor of science programme in APE-Architecture and Building Construction, the Master of science Degree in Management of the Built Environment).

2007 - 2015	Member of the Board (Giunta) of the School of Architecture and Society (formerly Faculty of Architecture and Society).
2007-2015	Member of the Board of the bachelor of science programme in Architecture and Building Construction.
2013 - present	Member of the Board (Giunta) of the ABC Department.
2015	Co-coordinator of the bachelor of science programme ITEA.
2005 - 2010	Member of the didactic commission of the BEST Department.
2003 -2011	Responsible for SAT (Strutture Accademiche Tirocini) (Internship academic structure) for the bachelor of science programme in Architecture and Building construction.
2002 - 2003	Member of the Board (Giunta) of the BEST Department.
1998 -2015	Supports, as co-coordinator, the coordinators (proff. A.Scoccimarro, C.Baldi, S.Mattia, E.Mussinelli) of the bachelor of science programme in Architecture and Building construction for the activities of planning and management of educational and teaching programmes.

6. CURRENT AND PAST RELEVANT ROLES IN STANDARDIZATION ACTIVITIES

2015 - present	President (chairperson) of the Sub Committee U/CT025/SC03 "Maintenance of real estate and facility" in UNI (Ente italiano di unificazione_ Italian standardization body).

2016 - present Delegate of the Sub Committee U/CT025/SC03 in the Working group 2 (GL2) "Risk management" of the technical committee UNI CT 043 "Safety of society and of the citizen" joint with CT 56 CEI "Reliability" in UNI (Ente italiano di unificazione_ Italian standardization body).

1999 - 2015 Coordinator/member of various working groups in UNI (Ente italiano di unificazione_ Italian standardization body) working at the issue of Italian standards in the field of building maintenance (**SEE 6.1**).

7. CURRENT ROLES IN SCIENTIFIC COMMITTEES

- Member of the scientific committee of the series "Architecture & Innovation" directed by prof. Michele di Sivo for Franco Angeli publisher.
- Member of the scientific committee of the series "Technology and Management for Building and Environment" directed by prof. Oliviero Tronconi for Aracne editore publisher.
- Member of the scientific committee of the scientific journal FMI (Facility Management Italia).
- Responsible, with prof. Claudio Molinari, of the Laboratory "Training and skills" within the Terotec Association (association for the development and the dissemination of culture and practices in the field of maintenance management and facility management).

8. TEACHING ACTIVITIES IN UNIVERSITY COURSES

Since 1990 with continuity in Politecnico di Milano, she has been teaching Bachelor of Science and Master of Science courses (**SEE 8.1, 8.2)** concerning: architectural technology, maintenance management, information systems for facility management. In the same fields, she is Graduate Supervisor of several Bachelor of Science and Master of Science thesis **(SEE 8.4).**

9. CURRENT AND PAST ROLES IN PH.D. BOARDS WITHIN POLITECNICO DI MILANO

2016 Head/coordinator of the TEPAC (Tecnologia e Progetto per l'Ambiente Costruito) (Technology and design for the built environment) Ph.D. board.

2012 - present Member of the ABC Ph.D. board.

2007- present Member of the TEPAC (Tecnologia e Progetto per l'Ambiente Costruito) (Technology and design for the built enviroment) Ph.D. board.

2001 - 2007 Member of the PMR (Programmazione Manutenzione Riqualificazione dei sistemi edilizi ed urbani) (Planning maintenance requalification of building and urban systems) Ph.D. board.

1994 - 2000 Carries out activities of support in the organization of didactic activities for the Ph.D. course "Technical innovation and design in architecture".

2000 - present Tutor and supervisor of several Ph.D. students' dissertations (**SEE 9.1**).

10. TEACHING ACTIVITIES IN SPECIALIZING MASTERS, POST GRADUATE COURSES AND PROFESSIONAL TRAINING

She is teacher in several specializing Masters (1st and 2nd level), in Politecnico di Milano and in other organizations, and in postgraduate courses for the subjects of planned maintenance, information systems for

facility management and maintainability evaluations for design (**SEE 10.1**).

11. CURRENT AND PAST RELEVANT ROLES IN RESEARCH ACTIVITIES WITHIN POLITECNICO DI MILANO

2012 - 2015 Scientific responsible of the research "Maintenance processes for worship buildings", research contract between Politecnico di Milano and CEI (Conferenza episcopale italiana_ Conference of Bishops). (**SEE 11.1**)

2012 - 2015 Responsible of the Task Competence dealing with Knowledge management in processes of planned maintenance and Facility Management within the PRIN research (Scientific Research Program Of Relevant National Interest) "Built Heritage Information Modelling/Management – BHIMM" (scientific coordinator prof. S. Della Torre) (research funded by MIUR Italian Ministry of Education, Universities and Research). (**SEE 11.2**)

2013 -2014 Scientific responsible of the research "The usefulness of the useless. Cross-sector recycle of waste in construction (reserch FARB (Finanziamento di Ateneo ricerca di base -University funding for basic research) funded by Politechnic of Milan). (**SEE 11.3**)

2012 - present Scientific responsible of the research "Monitoring and evaluation of contracts in Global service for the management of university buildings" (research funded by ATE (Area Tecnico Edilizia _Technical Area) of the Politechnic of Milan). (**SEE 11.4**)

2012- 2015 Takes part in the research "INNOVANCE" on the theme of technical information for construction products for BIM (Building Information Modeling) tools (client: Ministry of Economic Development - Industry notice 2015 project leader: Edilstampa Srl; Role of Polimi: partner; internal Polimi scientific responsible: prof. Stefano Della Torre; project manager: prof. Bruno Daniotti)

2010 - 2011 Proposer, together with Proff. Paolo Gasparoli (Scientific responsible), Stefano Della Torre, and Giancarlo Paganin of the research "Monument to Vittorio Emanuele II in Rome. Cognitive activities preparatory for the development of a maintenance plan of the Vittoriano monument (research funded by the Italian Ministry of Heritage and Culture). (**SEE 11.5**)

2010 – 2012 Scientific responsible of the research "Development of a prototype of maintenance plan" (research funded by ATE (Area Tecnico Edilizia _Technical Area) of the Politechnic of Milan). (**SEE 11.6**)

2010 – 2014 Scientific coordinator of the research group within BEST department developing the research: "Development of a quality technical specification for interventions promoted, designed and manufactured by the Consortium Casedoq" (research funded by Consortium for quality housing in the bergamo valley "Consorzio Per L'edilizia Di Qualità Della Pianura Bergamasca"). (**SEE 11.7**)

2010 – 2011 Scientific coordinator of the research group, within BEST department, developing the research: "Energy performance assessment of exhibition buildings in Europe" (research funded by EMECA "European Major Exhibition Centres Association").(**SEE 11.8**)

2009 – 2011 Scientific coordinator of the research "Study of technological alternatives for improving the energy performance of building envelopes of buildings of the exhibition centre in Milano Fair in Rho" (research contract between Politechnic of Milan and Fiera Milano SpA). (**SEE 11.9**)

2009 - 2010 Scientific responsible of the research "A research project aiming at defining strategies of enhancement of a public real estate through technological refurbishing" (research funded by EXITone company). (**SEE 11.10**)

2004 - 2007 Scientific coordinator of the research group within BEST department developing the research: "Development of a model for estimating long-term cement demand in Italy" (research funded

by Fondazione del Politecnico di Milano (Polytechnic foundation) for the Client AITEC "Associazione Italiana Tecnico Economica Del Cemento" (Italian Technical Economical association for Cement). (**SEE 11.11**)

2003 – 2004 Member of the Interdepartmental Research Project engaging departments BEST and DIG (II and VI School of Engineering, I School of Architecture) for the proposal of the Master of science Degree in "Management of the built environment." The proposal was approved and the course of the Master of science started up in the year 2004-2005.

1999 - 2002 Is in the research group of the Di.Tec department coordinated by prof. A.Scoccimarro, developing the research: "Development of an information system for the maintenance management of Lombard ALER (public housing companies of Lombardia Region)" (research funded by AIRE)

1999 - 2002 Scientific coordinator of the research "Project of an information system for the registry and scheduled maintenance of the Real estate of the Politecnico di Milano and the realization of its computerized version (funding according to Regulations AFC ex art. 4). (**SEE 11.12**)

1999 - 2000 Is in the research group coordinated by prof. V.Di Battista developing the research: "Self-evaluation form of the risk of collapse of buildings in the Lombard real estate" (research funded by Lombardy Region).

1999 - 2000 Scientific coordinator of the research "The conservation of urban quality and the system of interventions on the existing real estate" (research funded by Chamber of Commerce of Milan, Scientific responsible prof. Molinari C.). (**SEE 11.13**)

1996 – 1998 Is in the research group coordinated by prof. G.Scudo developing the research: multimedia information system for the assessment of the operational facility as a support for didactic in the technological area (funded by the Centre for University Teaching Software Center, Metid).

1996 - 1998 Is in the research group coordinated by prof. C. Molinari developing the research on the topic of multimedia information system as a support for didactic in the technological area (funded by the Centre for University Teaching Software Center, Metid).

1999-2000 Participates to the research "Policies, projects and techniques of rehabilitation and transformation of urban suburbs", working on the topic of decision support systems for the development of real estate policies and management strategies" (funded by Ministry of University and Scientific research MURST).

1994 -1995 Participates to the research, coordinate by prof. G. Nardi, "Study for the development of computerized analytical tools for assessing the convenience to the use of an innovative mixed system" (funded by National Council of Research CNR).

1992 - 1993 Participates to the research, coordinate by prof. G. Nardi, "Simulation of building elements" (funded by CNR).

1990 - 1991 Participates to the research, coordinate by prof.G. Nardi, "Heuristic design and information technologies" (funded by CNR).

1990 -1991 Participates to the research, coordinate by prof. C.Molinari, "Development of a multimedia system for didactic applications for the technological area" Heuristic design and information technologies" (funded by Ministry MURST).

1989 -1988 Participates to the research, coordinate by prof. C.Molinari, "Assessment of maintainability of building elements" (funded by Ministry of Education MPI).

12. PRINCIPAL RESEARCH FIELDS

Her research interests have been developed in various fields.

The main and longest-term interests are in the field of planned maintenance and facility management, developing researches in the areas of:

- Building maintenance manuals and programs (structure, application procedures, organization of information, data bases);
- Urban maintenance (facility management services for urban assets and networks, organization of information);
- Organizational models for building and urban facility management;
- Inventory and registries for knowledge management of built assets (data bases, procedures, relation with information systems);
- Information systems for Real Estate management;
- BIM (Building Information Modelling) application in operations and maintenance phase of the building process;
- Knowledge management for the enhancement of Real Estate;
- The maintainability requirement in the design phase of the building process;
- Tasks, competences, skills and training for maintenance managers;
- Big Data and IoT (internet of things) for the management of built assets at the urban scale.

Connected with the studies in the field of maintenance there are interests in the field of energy retrofit, especially in the area of simulation and comparison of technical solutions for the improvement of the thermal behaviours of existing buildings.

At the beginning of her research activities, she had been studying in depth for several years the relationship between heuristic project and information technologies, investigating the possible influences of computer on creative processes during the design phase.

A recent area of interest is related to waste recycling strategies and procedures, developing studies and researches regarding:

- Strategies for the improvement of waste recycling in the field of marble sector (environmental assessment methodologies, analysis of processes);
- Cross sector waste recycling in the perspective of industrial symbiosis and circular economy;
- Knowledge management for the waste recycling.

The experiences and the knowledge developed within the various fields of research, especially those regarding maintenance management, have been transferred and disseminated in other areas of activity, such as publications, teaching in university courses, specializing Masters and continuing education and writing of UNI standards.

13. PUBLICATIONS

She is author of several publications (books, essays, conference proceedings, journal articles) dealing with her various research fields of interest (**SEE 13.1-13.5**).

DETAILED DESCRIPTION OF THE ACTIVITIES

6. CURRENT AND PAST RELEVANT ROLES IN STANDARDIZATION ACTIVITIES

6.1 UNI STANDARDS DEVELOPED AS MEMBER/COORDINATOR OF VARIOUS WORKING GROUPS IN UNI

UNI STANDARDS TITLES	DESCRIPTION	ROLE
UNI 10831-1:1999 Documentation and basic information for maintenance services of projects approved and executed. Structure, contents and levels of documentation	Definition of project documentation for the proper setting of the maintenance service	Member
UNI 10831-2:2001 Maintenance of buildings. Documentation and basic information for maintenance services of projects approved and executed. Details of content of technical documentation and lay-out models		Member
UNI 10874:2000 Maintenance of buildings Criteria in order to write maintenance and use manuals	Definition of the information to be collected in order to develop maintenance manuals	Member
UNI 10951:2001 Systems of information for the maintenance management of buildings. Guidelines	Provide methodological and operational guidelines for the design, construction, operation and upgrading of information systems for maintenance management of real estate assets and for the relative computerization	Member/ coordinator
UNI 11136:2004 Global service for maintenance of buildings. Guidelines	Guidelines for some basic steps in the process of developing a Global Service contract, namely: – setting the stage preliminary on the customer's side – setting the stage of request of offer on the customer's side – setting the stage of draft offer on the supplier's side	Member
UNI 11257:2007 Maintenance of buildings Criteria for the drafting of plan and programme of maintenance of buildings. Guidelines	Provide the criteria for drawing up plans and programs of maintenance applicable to existing buildings and buildings under construction	Coordinator
UNI 11447:2012 Urban facility management services. Guidelines to set and program contracts	Provide guidelines to customers for setting and programming procurement processes of Facility Management Urban services (FMU), in order to standardize the approach based on common methodological references and to classify urban assets and services	Coordinator

8. TEACHING ACTIVITIES IN UNIVERSITY COURSES

8.1 BACHELOR AND MASTER OF SCIENCE COURSES

2015-2016

Bachelor of Science

- Course of TECHNOLOGICAL DESIGN ARCHITECTURE (module 8 ECTS) within the Workshop course BUILDING TECHNOLOGY STUDIO (12 ECTS) (responsible for the whole course), School of Architecture Urban Planning Construction Engineering (until 2015 School of Architecture and Society), Architectural Design degree.
- Course of PROCESSES, TOOLS AND METHODS OF BUILDING MAINTENANCE (module 6 ECTS) within the integrated course Maintenance and Restoration (10 ECTS); School of Architecture and Society, Architecture and Building Construction degree.

Master of Science

- Course of INFORMATION SYSTEMS FOR THE MAINTENANCE AND MANAGEMENT (9 ECTS), School of Architectural Engineering, Management of Built Environment degree (held in english).

2014-2015

Bachelor of Science

- Course of TECHNOLOGICAL DESIGN ARCHITECTURE (module 4 ECTS) within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (12 ECTS) (responsible for the whole course), School of Architecture and Sociey, Architecture Science degree.
- Course of PROCESSES, TOOLS AND METHODS OF BUILDING MAINTENANCE (module 6 ECTS) within the integrated course Maintenance and Restoration (10 ECTS); School of Architecture and Society, Architecture and Building Construction degree.

Master of Science

- Course of INFORMATION SYSTEMS FOR THE MAINTENANCE AND MANAGEMENT (9 ECTS), School of Architectural Engineering, Management of Built Environment degree.

2013-2014

Bachelor of Science

- Course of TECHNOLOGICAL DESIGN ARCHITECTURE (module 4 ECTS) within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (12 ECTS) (responsible for the whole course), School of Architecture and Society, Architecture Science degree.

- Course of PROCESSES, TOOLS AND METHODS OF BUILDING MAINTENANCE (module 6 ECTS) within the integrated course Maintenance and Restoration (10 ECTS); School of Architecture and Society, Architecture and Building Construction degree.

Master of Science

- Course of INFORMATION SYSTEMS FOR THE MAINTENANCE AND MANAGEMENT (9 ECTS), School of Architectural Engineering, Management of Built Environment degree.

2012-2013

Bachelor of Science

- Course of TECHNOLOGICAL DESIGN ARCHITECTURE (module 4 ECTS) within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (12 ECTS) (responsible for the whole course), School of Architecture and Society, Architecture Science degree.

- Course of PROCESSES, TOOLS AND METHODS OF BUILDING MAINTENANCE (module 4 ECTS) within the integrated course Maintenance and Restoration (8 ECTS); School of Architecture and Society, Architecture and Building Construction degree.

Master of Science

- Course of INFORMATION SYSTEMS FOR THE MAINTENANCE AND MANAGEMENT (9 ECTS), School of Architectural Engineering, Management of Built Environment degree.

2011-2012

Bachelor of Science

- Course of TECHNOLOGICAL DESIGN ARCHITECTURE (module 8 ECTS) within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (12 ECTS) (responsible for the whole course), School of Architecture and Society, Architecture Science degree.

- Course of PROCESSES, TOOLS AND METHODS OF BUILDING MAINTENANCE (module 4 ECTS) within the integrated course Maintenance and Restoration (8 ECTS); School of Architecture and Society, Architecture and Building Construction degree.

Master of Science

- Course of INFORMATION SYSTEMS FOR THE MAINTENANCE AND MANAGEMENT (module 5 ECTS), within the integrated course BUILDING MAINTENANCE PROCEEDINGS AND METHODS + INFORMATION SYSTEMS FOR THE MAINTENANCE AND MANAGEMENT (10 ECTS) School of Architectural Engineering, Management of Built Environment degree.

2010-2011

Bachelor of Science

- Course of TECHNOLOGICAL DESIGN ARCHITECTURE (module 8 ECTS) within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (12 ECTS) (responsible for the whole course), School of Architecture and Society, Architecture Science degree.

- Course of PROCESSES, TOOLS AND METHODS OF BUILDING MAINTENANCE (module 4 ECTS) within the integrated course Maintenance and Restoration (8 ECTS); School of Architecture and Society, Architecture and Building Construction degree.

Master of Science

- Course of INFORMATION SYSTEMS FOR THE MAINTENANCE AND MANAGEMENT (module 5 ECTS), within the integrated course BUILDING MAINTENANCE PROCEEDINGS AND METHODS + INFORMATION SYSTEMS FOR THE MAINTENANCE AND MANAGEMENT (10 ECTS) School of Architectural Engineering, Management of Built Environment degree.

2010-2009

Bachelor of Science

- Course of TECHNOLOGICAL DESIGN ARCHITECTURE (module 8 ECTS) within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (12 ECTS) (responsible for the whole course), Faculty of Architecture and Society, Architecture Science degree.

- Course of PROCESSES, TOOLS AND METHODS OF BUILDING MAINTENANCE (module 4 ECTS) within the integrated course Maintenance and Restoration (8 ECTS); Faculty of Architecture and Society, Architecture and Building Construction degree.

Master of Science

- Course of INFORMATION SYSTEMS FOR THE MAINTENANCE AND MANAGEMENT (module 5 ECTS), within the integrated course BUILDING MAINTENANCE PROCEEDINGS AND METHODS + INFORMATION SYSTEMS FOR THE MAINTENANCE AND MANAGEMENT (10 ECTS) Faculty of Architectural Engineering, Management of Built Environment degree.

2008-2009

Bachelor of Science

- Course of TECHNOLOGICAL DESIGN ARCHITECTURE (module 8 ECTS) within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (12 ECTS) (responsible for the whole course), Faculty of Architecture and Society, Architecture Science degree.

- Course of PROCESSES, TOOLS AND METHODS OF BUILDING MAINTENANCE (module 4 ECTS) within the integrated course Maintenance and Restoration (8 ECTS); Faculty of Architecture and Society, Architecture and Building Construction degree.

Master of Science

- Course of INFORMATION SYSTEMS FOR THE MAINTENANCE AND MANAGEMENT (module 5 ECTS), within the integrated course LABORATORY OF FACILITY MANAGEMENT + INFORMATION SYSTEMS FOR THE MAINTENANCE AND MANAGEMENT (10 ECTS) Faculty of Architectural Engineering, Management of Built Environment degree.

- Course of FINAL LABORATORY FOR THE TECHNICAL MANAGEMENT OF THE BUILT ENVIRONMENT part II (3,5 ECTS), Faculty of Architectural Engineering, Management of Built Environment degree.

2007-2008

Bachelor of Science

- Course of TECHNOLOGICAL DESIGN ARCHITECTURE (module 7 ECTS) within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (10 ECTS) (responsible for the whole course), Faculty of Architecture and Society, Architecture Science degree.

- Course of PROCESSES, TOOLS AND METHODS OF BUILDING MAINTENANCE (module 4 ECTS) within the integrated course Maintenance and Restoration (8 ECTS); Faculty of Architecture and Society, Architecture and Building Construction degree.

Master of Science

- FINAL LABORATORY FOR THE TECHNICAL MANAGEMENT OF THE BUILT ENVIRONMENT part II (3,5 ECTS), Faculty of Architectural Engineering, Management of Built Environment degree.

2007-2006

Bachelor of Science

- Course of TECHNOLOGICAL DESIGN ARCHITECTURE (module 7 ECTS) within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (10 ECTS) (responsible for the whole course), Faculty of Architecture and Society, Architecture Science degree.

- Course of PROCESSES, TOOLS AND METHODS OF BUILDING MAINTENANCE (module 4 ECTS) within the integrated course Maintenance and Restoration (8 ECTS); Faculty of Architecture and Society, Architecture and Building Construction degree.

Master of Science

- FINAL LABORATORY FOR THE TECHNICAL MANAGEMENT OF THE BUILT ENVIRONMENT part II (3,5 ECTS), Faculty of Architectural Engineering, Management of Built Environment degree.

2005-2006

Bachelor of Science

- Course of TECHNOLOGICAL DESIGN ARCHITECTURE (module 7 ECTS) within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (10 ECTS), (responsible for the whole course), School of Architecture and Society, Architecture Science degree.

- Course of PROCESSES, TOOLS AND METHODS OF BUILDING MAINTENANCE (module 4 ECTS) within the integrated course Maintenance and Restoration (8 ECTS); School of Architecture and Society, Architecture and Building Construction degree.

2004-2005

Bachelor of Science

- Course of TECHNOLOGICAL DESIGN ARCHITECTURE (module 7 ECTS) within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (10 ECTS) (responsible for the whole course), School of Architecture and Society, Architecture Science degree.

- Course of PROCESSES, TOOLS AND METHODS OF BUILDING MAINTENANCE (module 4 ECTS) within the integrated course Maintenance and Restoration (8 ECTS); School of Architecture and Society, Architecture and Building Construction degree.

2003-2004

Bachelor of Science

- Course of TECHNOLOGICAL DESIGN ARCHITECTURE (module 7 ECTS) within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (10 ECTS) (responsible for the whole course), Faculty of Architecture, Urban Planning and Environment, Architecture Science degree.

2002-2003

Bachelor of Science

- Course TECHNOLOGICAL DESIGN ARCHITECTURE within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (120 hours) (responsible for the whole course), Faculty of Architecture, Urban Planning and Environment, Architecture Science degree.

Master of Science Five years single cycle

- Course of PROCESSES AND METHODS OF BUILDING MAINTENANCE (module 30 hours) within the Final laboratory "Restoration and building and urban maintenance" (coordination prof. C.Fontana) Faculty of Architecture, Urban Planning and Environment.

2001-2002

Bachelor of Science

- Course TECHNOLOGICAL DESIGN ARCHITECTURE within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (120 hours) (responsible for the whole course), Faculty of Architecture, Urban Planning and Environment.

Master of Science Five years single cycle

- Course of PROCESSES AND METHODS OF BUILDING MAINTENANCE (module 30 hours) within the Final laboratory "Restoration and building and urban maintenance" (coordination prof. V. Di Battista) Faculty of Architecture, Urban Planning and Environment.

2000-2001

- One year maternity leave.

1999-2000

Bachelor of Science

- Course TECHNOLOGICAL DESIGN ARCHITECTURE within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (120 hours) (responsible for the whole course), I Faculty of Architecture, Architecture Science Degree

Master of Science Five years single cycle

- Course of PROCESSES AND METHODS OF BUILDING MAINTENANCE (module 30 hours) within the Final laboratory "Restoration and building and urban maintenance" (coordination prof. V. Di Battista) Faculty of Architecture.

1996-1997

Master of Science Five years single cycle

- Course TECHNOLOGICAL DESIGN ARCHITECTURE within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (120 hours) (responsible for the whole course), I Faculty of Architecture, Architecture Science degree.

1997-1998

Master of Science Five years single cycle

- Course TECHNOLOGICAL DESIGN ARCHITECTURE within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (120 hours) (responsible for the whole course), I Faculty of Architecture, Architecture Science degree.

1998-1999

Master of Science Five years single cycle

- Course TECHNOLOGICAL DESIGN ARCHITECTURE within the Workshop laboratory BUILDING TECHNOLOGY STUDIO (120 hours) (responsible for the whole course), I Faculty of Architecture.

8.2 SEMINARS MODULES WITHIN UNIVERSITY COURSES

Master of Science Five years single cycle

She organizes and is responsible of seminars concerning information technologies, creativity and innovations

in architectural design within prof. Guido Nardi's courses of Architectural Technology II:

1992 - 1997 Seminar "Computer applications for architectural design";

1991 - 1992 Seminar "The circuits of invention";

1990 - 1991 Seminar "Constructions and informatics";

1989 - 1990 Seminar " Innovation of design techniques: project and IT

8.3 SEMINARS MODULES WITHIN PH.D. COURSES

2006 - 2004

- Course module "Information systems for the management of real estate" (4 ECTS) within the Ph.D. Program in PMR (Programmazione Manutenzione Riqualificazione dei sistemi edilizi ed urbani) (Planning maintenance requalification of building and urban systems) (dip. BEST).

8.4 GRADUATE THESIS SUPERVISION

2016-2015

Master of Science

- Flexibility of facility management services: implementation of a flexible contract for Tenaris Daimine s.p.a. *(Flessibilità dei servizi di facility management: implementazione di un contratto flessibile per Tenaris Daimine s.p.a.*), PORRAS GUTIERREZ ANDRES VICTOR, School of Architectural Engineering, Management of Built Environment degree.
- The unitary vision of the building process: from the BRIEF to the POE (*La visione unitaria del processo edilizio: dal DPP alle POE*), CASIRAGHI SIMONA, School of Architectural Engineering, Management of Built Environment degree.

2015-2014

Bachelor of Science

- Contents and potentialities of the brief document. Criteria for the preparation and use of a brief for hospitals design (*Contenuti e potenzialita' del documento preliminare alla progettazione Criteri per la stesura e l'utilizzo di un DPP in ambito ospedaliero*), FERRARI FEDERICA, GAMBA GIULIA, School of Architecture and Society, Architecture Science Degree
- Organization and services of student housing: the Politecnico di Milano and other structures of excellence in comparison (*L'organizzazione ed i servizi degli alloggi per studenti: il Politecnico di Milano ed altre strutture di eccellenza a confronto*) VITALE MARCO, School of Architecture and Society, Architecture and Building Construction degree

Master of Science

- Unitarity of the building process and skills. Proposal of a training offer for the role of the project manager and the facility manager for buildings for worship (*Unitarietà del processo edilizio e competenze. Proposta di un'offerta formativa per il responsabile del procedimento e il gestore nell'ambito dell'edilizia di culto*) CAVANE' JESSICA, School of Architectural Engineering, Management of Built Environment degree

2014-2013

Bachelor of Science

- The preliminary assessment of maintainability '. Assumptions for the applications in BIM environment for the management of buildings for worship *(La valutazione preliminare della manutenibilita'. Ipotesi di applicazione in ambiente BIM per la gestione di edifici per il culto),* WANG QI, PRAVETTONI SELENE , School of Architecture and Society, Architecture Science Degree
- Maintenance of contemporary buildings for worship: proposal for a database of recurring degradations *(Manutenzione degli edifici di culto contemporanei: Proposta di una base dati relativa ai degradi ricorrenti)*. IMONTI SOFIA, MACALLI LORENZO, School of Architecture and Society, Architecture and Building Construction degree
- Procedures for the preparation of a maintenance plan for a swimming pool: The case of the pubblic sports center in Desio (*Procedure per la stesura di un piano di manutenzione per un impianto natatorio: Il caso della piscina comunale di Desio (MB*)), VALENTINI MARCO , School of Architecture and Society, Architecture and Building Construction degree

Master of Science

- Building Information Modeling for the management of real estate. Process analysis for the implementation of innovative management models (*Building Information Modeling per la gestione del patrimonio immobiliare costruito. Analisi dei processi per l'implementazione di modelli innovativi di gestione*), BISIN MARCO, School of Architectural Engineering, Management of Built Environment degree
- Proactive monitoring of the performance for the maintenance services: Case Study "Italian Post" analysis and implementation of process control for the efficiency of maintenance services of post offices (*Il controllo proattivo delle performance per i servizi manutentivi: Il Caso Studio "Poste Italiane" analisi ed implementazione del processo di controllo per l'efficientamento dei servizi manutentivi degli uffici postali*), LA FRONZA ILARIA, School of Architectural Engineering, Management of Built Environment degree
- Information and documents for the management of a real estate fund *(Informazioni e documenti per la gestione dei processi di un fondo immobiliare),* COLOMBINI LUCA, School of Architectural Engineering, Management of Built Environment degree
- Criteria for the preparation of tenders for a facility management services. The case of Tenaris Dalmine: preparation of tender documents for services FM for the real estate of Dalmine Spa (*Criteri di redazione per un capitolato di servizi di facility management di manutenzione. Il caso di Tenaris Dalmine: redazione del capitolato speciale d'appalto di servizi di fm per il patrimonio immobiliare di Dalmine s.p.a.*), SUTTO ALESSANDRO, School of Architectural Engineering, Management of Built Environment degree

- Proposal of a tool for assessing the maintainability for buildings for worship ***(****Proposta di uno strumento di valutazione della manutenibilita' per gli edifici per il culto****)***, PASSERI DANIELA, School of Architectural Engineering, Management of Built Environment degree

2013-2012

Bachelor of Science

- Social housing: new perspectives (*Social housing: nuove prospettive abitative)*, COLOMBO ALESSANDRO , School of Architecture and Society, Architecture and Building Construction degree
- Smart city: the convergence of bits and atoms *(Smart city: la convergenza tra bit e atomi*) ROCCA ALESSANDRO, School of Architecture and Society, Architecture and Building Construction degree
- Knowledge of urban and building assets: the construction of a registry for a small town (*Cono*scenza dei beni edilizi e urbani: la costruzione di un'anagrafica per un comune di piccole dimensioni), GUTIERREZ PORRAS VICTOR ANDRES , School of Architecture and Society, Architecture and Building Construction degree
- The Real estate inventory for local authorities: the case of town of Pontoglio (Il Censimento Immobiliare negli Enti Locali: il caso del Comune di Pontoglio), MARELLA ALESSANDRA , School of Architecture and Society, Architecture and Building Construction degree
- The demand for management services for university Real estate (*La domanda di servizi di gestione per i patrimoni universitari*), BELLINI ALESSIA , School of Architecture and Society, Architecture and Building Construction degree.
- Survey on contemporary buildings of worship for planning maintenance (*Indagine sugli edifici di culto contemporanei al fine della manuteznione programmata*), CASIRAGHI SIMONA, School of Architecture and Society, Architecture and Building Construction degree.

Master of Science

- Management and KPI information organization. The case staudy: "Student House" *(Gestione dei KPI e organizzazione delle informazioni. Il caso: "Casa dello Studente*"), CIANI VALENTINA , School of Architectural Engineering, Management of Built Environment degree
- Due diligence for the disinvestment of public real estate through the use of the information system. Case study: application model for a complex public property *La due diligence per le operazioni di dismissione del patrimonio immobiliare pubblico mediante l'utilizzo del sistema informativo. Caso studio: modello applicativo per un complesso patrimonio pubblico*, BOSCOLO FABIO, School of Architectural Engineering, Management of Built Environment degree

2012-2011

Bachelor of Science

- Building Information Modeling: new technologies for real estate Management (*Building Information Modeling: nuove tecnologie per la gestione immobiliare*), BISIN *MARCO,* School of

Architecture and Society, Architecture and Building Construction degree.

- Maintenance in hospital builldings: orientations for the inclusion of the requirement of maintainability in the D.P.P. *(La manutenzione nei complessi ospedalieri: indirizzi per l'inclusione del requisito di manutenibilita' nel D.P.P.),* LONATI STEFANO, School of Architecture and Society, Architecture and Building Construction degree
- Information in a small public real estate management *(L'informazione nella gestione di un piccolo patrimonio immobiliare pubblico),* COLOMBINI LUCA, School of Architecture and Society, Architecture and Building Construction degree.
- Design and maintenance. The case of contemporary churches, *(Progetto e Manutenzione, Il caso delle chiese contemporanee)* VASTA ROBERTO, School of Architecture and Society, Architecture Science degree.
- The environmental certifications of buildings *(Le certificazioni ambientali degli edifici)* LARCHER GIORGIO, School of Architecture and Society, Architecture Science degree.

Master of Science

- The central role of information systems in the change of the organizational model for the management of maintenance: the case Fiera Milano Spa *(La centralità del sistema informativo nel cambiamento del modello organizzativo per la gestione della manutenzione: il caso Fiera Milano Spa),* MAIFREDI ANDREA RENATO, School of Architectural Engineering, Management of Built Environment degree.
- Management real estate and energy efficiency: the proposal and testing of a methodology for the definition of strategies of riqualification. The case of energy management of Fiera Milano Spa *(Gestione immobiliare ed efficienza energetica: proposta e sperimentazione di una metodologia per la definizione di strategie di riqualificazione. Il caso dell'energy management di Fiera Milano Spa),* MARELLI BARBARA, School of Architectural Engineering, Management of Built Environment degree.
- Coordination, management, control. The role of the command center in public services: the case CONSIP (*Coordinare, gestire, controllare. Il ruolo della centrale di governo negli appalti pubblici di servizi: il caso CONSIP),* PROVERA MATTEO, School of Architectural Engineering, Management of Built Environment degree.
- Management of bank assets leased: proposal of a module for information systems for information management of due diligence for real estate *(Gestione di patrimoni bancari fruiti in locazione : proposta di modulo di sistema informativo per la gestione delle informazioni di due diligence immobiliare),* VOUTE FABIO CHRISTIAN, School of Architectural Engineering, Management of Built Environment degree.
- The management of safety systems in Facility Management services: University of Milan Bicocca *(La gestione dei sistemi di sicurezza negli edifici in un contesto di Facility Management: Università degli Studi di Milano Bicocca),* MOLINAS LORENZO, School of Architectural Engineering, Management of Built Environment degree.
- Environmental certifications. From certification of building quality to line guide tools in the design process *(Le certificazioni ambientali. Dall'attestazione della qualità edilizia a strumento guida nel processo progettuale),* TURRINI ROBERTA, CRUGNOLA VERONICA, School of Architectural Engineering, Management of Built Environment degree.
- Risk management systems in exhibition complexes: criticality, interference and logistics management (*Risk management nei sistemi fieristici complessi: criticità, interferenze e gestione logistica),* SEGATTINI ANNA, School of Architectural Engineering, Management of Built

Environment degree.

- The information system as a tool for project planning. The case Reag within the platform Archibus *(Il sistema informativo come strumento di pianificazione progettuale. Il caso Reag nella piattaforma Archibus),* LUPI GIAN MARIA, School of Architectural Engineering, Management of Built Environment degree.

2011-2010

Master of Science

- The requirement of maintainability of buildings of worship. Proposal for guidelines for setting and evaluation of projects, (*Il requisito di manutenibilità nell'edilizia di culto. Proposta di linee di indirizzo per l'impostazione e la valutazione dei progetti*), CREMASCHI ELISA e DI BETTA GIACOMO , Faculty of Architectural Engineering, Management of Built Environment degree.
- The control of the draft of the offer by the client in the stages leading to the provision of services in global service (*Il controllo del progetto di offerta da parte della committenza nelle fasi propedeutiche all'erogazione di un servizio in global service*), DOLORES SILVIA , Faculty of Architectural Engineering, Management of Built Environment degree.
- Evaluation of strategies of retrofit in the life cycle. Case history: Fiera Milano SPA (*Valutazione di strategie di retrofit nel ciclo di vita. Case history : Fiera Milano SPA*) SALERI ALESSANDRA, Faculty of Architectural Engineering, Management of Built Environment degree.
- Feasibility studies for commercial real estate. Process models and research areas for improvement (*Gli studi di fattibilità per gli insediamenti commerciali. Modelli di processo e ricerca delle aree di miglioramento*), SCARABELLI GIOVANNI MARIA, Faculty of Architectural Engineering, Management of Built Environment degree.
- Knowing and sharing. Creating synergies between business functions through the sharing of information about real estate Tenaris Dalmine (*Conoscere e condividere. Creazione di sinergie tra funzioni aziendali tramite la condivisione dell'informazione sul patrimonio immobiliare di Tenaris Dalmine*), COZZI MAURO, Faculty of Architectural Engineering, Management of Built Environment degree.
- Drafting of documents and procedures for the construction of a specification of management services for maintenance (*Redazione di documenti e procedure per la costruzione di un capitolato di servizi di gestione per la manutenzione*), ROSA FULVIO , Faculty of Architectural Engineering, Management of Built Environment degree.
- Organization of supervision and tools for the evaluation of performances in a global service contract. Case study: University Residence Galileo Galilei, (*Organizzazione del controllo e strumenti di rilevazione delle performance in un contratto di global service. Caso studio : residenza universitaria Galileo Galilei*), SALAMANCA FABIO, Faculty of Architectural Engineering, Management of Built Environment degree.
- The Consip convention and the experience Manutencoop (*Le convenzioni Consip e l'esperienza Manutencoop*), ARDIGO' DAVIDE, Faculty of Architectural Engineering, Management of Built Environment degree.
- The strategic management of maintenance and the information flows in buildings with a high specificity and equipment complexity: the case CNAO (*La gestione strategica della manutenzione e i flussi informativi in edifici caratterizzati da una elevata specificità e complessità impiantistica: il caso CNAO*), FRIGERIO ALBERTO, Faculty of Architectural Engineering, Management of Built Environment degree.

- Information in the executive project considering maintenance aspects. Case study: university residences at Politecnico di Milano (*L'articolazione informativa nel progetto esecutivo ai fini della manutenzione. Il caso studio: residenze universitarie del Politecnico di Milano*), STANTE ESTER, RONGONE FEDERICA, Faculty of Architectural Engineering, Management of Built Environment degree.
- The reality of small property owners: problems and management tools (*La realtà dei piccoli proprietari immobiliari : problematiche e strumenti di gestione*), SCANU GIANNINA, SELLA ALESSANDRO, Faculty of Architectural Engineering, Management of Built Environment degree.
- Stone, production cycles and environment. Proposal of a methodology for the evaluation of strategic scenarios for the development of the mining industry in the marble basin of Apricena (*Pietra, cicli produttivi e ambiente. Proposta di una metodologia per la valutazione di scenari strategici per la valorizzazione della filiera estrattiva marmifera nel bacino di Apricena*), MIGLIORE MARCO, SANGIACOMI ELISA, Faculty of Architecture and Society, Architecture Science degree.
- An Adaptive system between temporary and emergency (*Un Sistema adattivo tra temporaneità ed emergenza*), AGOSTINELLI GIULIA, Faculty of Architecture and Society, Architecture Science degree.

2009-2008

Bachelor of Science

- Building with wood: from raw materials to disposal *(Costruire con il legno: dalla materia prima alla dismissione),* AGOSTINELLI GIULIA, Faculty of Architecture and Society, Architecture Science Degree
- The green architectural shell: criteria and design techniques *(L'involucro architettonico verde: criteri e tecniche di progettazione),* CORDO' ANDREA, Faculty of Architecture and Society, Architecture Science Degree
- Stone materials between mass and lightness. Topics of study for training and research *(Materiali lapidei tra massività e dissolvenza. Temi di approfondimento per la formazione e la ricerca)* MIGLIORE MARCO, Faculty of Architecture and Society, Architecture Science Degree
- Natural cooling techniques in contemporary architecture (*Tecniche di raffrescamento naturale nell'architettura contemporanea),* SANTAMBROGIO NICOLE, Faculty of Architecture and Society, Architecture Science Degree
- Architecture for semptum, semptum for architecture, (*Architetture per setti - setti per architetture), QUITADAMO DOMENICO,* Faculty of Architecture and Society, Architecture Science Degree

2007-2008

- Knowing, forecasting, planning. Methods and tools for the improvement of the management of real estate of unique destination (*Conoscere, prevedere, pianificare. Metodi e strumenti per il miglioramento dei processi di gestione dei patrimoni immobiliari a destinazione unica*), MARTANI CLAUDIO, Faculty of Architectural Engineering, Management of Built Environment Degree.
- Strategies and instruments for a Real Estate as a system. The case of the covered markets in Milan

(Strategie e strumenti di intervento di un patrimonio sistema. Il caso dei mercati coperti di Milano), DE ALBERTIS REGINA e MALAMACCI ELVIRA, Faculty of Architectural Engineering, Management of Built Environment Degree.

- Space planning and facility management of a micro environment: the office space in commercial buildings. Development of a dashboard for the control of management *(Space planning e facility management di un micro contesto: lo spazio ufficio negli edifici terziari. Realizzazione di un cruscotto direzionale per il controllo di gestione),* PARMA SILVIA, Faculty of Architectural Engineering, Management of Built Environment Degree.

2006-2007

Bachelor of Science

- Solar systems (*Sistemi di captazione solare*), DE MICHELIS LUDOVICA, Faculty of Architecture and Society, Architecture Science Degree
- Aluminum and life cycle of building components (*Alluminio e ciclo di vita dei componenti edilizi*), ZONCA ELENA, Faculty of Architecture and Society, Architecture Science Degree.

Master of Science

- Liveability, balance, energy. Proposal for the redevelopment of a part of the lakefront of Arona seaeching for a new environmental quality (*Vivibilità, equilibrio, energia. Proposta per la riqualificazione di un tratto del lungolago di Arona alla ricerca di una nuova qualità ambientale*), MORESSA PAMELA e PALOSCHI SERENA, Faculty of Architecture and Society, Architecture Science Degree.
- Strategies for rehabilitation of buildings for the service sector. The role of simulation tools (*Strategie di riqualificazione energetica degli edifici per il terziario. Il ruolo degli strumenti di simulazione*), COSTA GAIA e DUCOLI CHIARA, Faculty of Architecture and Society, Architecture Science Degree.
- Organization, control and procedures: guidelines for a new maintenance management process for school buildings in the province of Milan (*Organizzazione, controllo e procedure: linee guida per un nuovo processo di gestione della manutenzione degli edifici scolastici della provincia di Milano*), GADDA ROBERTA, Faculty of Architectural Engineering, Management of Built Environment Degree.
- Property Management and Energy Efficiency (*Gestione Immobiliare ed Efficienza Energetica*), GRIMANLDI ALFONSO, Faculty of Architectural Engineering, Management of Built Environment Degree.

2005-2006

Bachelor of Science

- Transfer processes and innovation in architectural design *(Processi di trasferimento e innovazione nel progetto di Architettura), DELL'AGOSTO PATRIZIA,* Faculty of Architecture and Society,

Architecture Science Degree.

- Architecture and Visual Mathematics, *(Architettura e matematica visive), BERTOLI ROBERTO,* Faculty of Architecture and Society, Architecture Science Degree.

Master of Science

- Idea Point. A system for the open spaces of the Politecnico *(Idea Point. Un sistema di attrezzature per gli spazi aperti del Politecnico) STAMPINI VANESSA,* Faculty of Architecture and Society, Architecture Science Degree.
- The Walser architetture between ancient and new technics: the case study of *Ronco (L'architettura Walser tra tecniche antiche e nuove: il caso di studio di Ronco) LEONE MONICA,* Faculty of Architecture and Society, Architecture Science Degree.
- Knowledge and control in the Global Service contracts for public housing. Criticality, data processing, proposals for improvement of the specifications for the contract of Global Service of the City of Milan (conoscenza *e controllo nei contratti di Global Service per l'edilizia residenziale pubblica. Criticità, trattamento dati, proposte di miglioramento del capitolato d'oneri per il contratto di Global Service del Comune di Milano*), SCALVI MARIA, Faculty of Architecture and Society, Architecture Science Degree.

2004 – 2005

Bachelor of Science

- The natural light in the exhibition *spaces (La luce naturale negli spazi espositivi),* ROSSETTO FABRIZIO, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree
- The metamorphosis of materials *(La metamorfosi dei materiali)* , COLOMBO ANDREA, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree
- The re-design of the glass material *(La riprogettazione del materiale vetro),* GAIA COSTA, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree
- Interior light: light, shadow, shape *(Interno luminoso: luce, ombra, forma),* PARORA SABINA, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree
- The boundary of the border: the skin of buildings *(Il confine del confine: la pelle degli edifici)* , LEGRAMANTI LAURA, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree
- *Flexibility (La flessibilità),* DUCOLI CHIARA, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree
- The role of Client in architecture (*Il ruolo della committenza in architettura),* GILBERTI FLAVIO, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree
- The role of the supplier in the design process *(Il ruolo del fornitore nel processo progettuale),* NIDOLA ALICE Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree
- Mathematics and architecture. Some considerations on the role of mathematics in the training of architects *(Matematica e architettura. Alcune riflessioni sul ruolo della matematica nella*

formazione degli architetti), PENZO FRANCESCA, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree

- Design and implementation. The concept of feasibility in the architectural project *(Progettazione e realizzazione. La dimensione della realizzabilità nel progetto architettonico),* LODA ROBERTA, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree
- Design and sustainability. Criteria and tools for a conscious design *(Progetto e sostenibilità. Criteri e strumenti per una progettazione consapevole),* PALOSCHI SERENA, Faculty of Architecture, Urban Planning and Environment , Architecture Science Degree
- Energy and envelope (*Energia e involucro),* BIANCHINI FIORENZA, Faculty of Architecture, Urban Planning and Environment , Architecture Science Degree
- *Design quality over time (La qualità del progetto nel tempo),* PARIZZI ANNALISA, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree

Master of Science

- Real estate management and evaluation strategies, *(Gestione immobiliare e strategie di valorizzazione),* ZENNARO LUCIANO, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree.
- Dry systems for residential buildings. Innovation strategies for plasterboard systems slabs (*I sistemi a secco per l'edilizia residenziale. Strategie di innovazione per i sistemi in lastre di gesso rivestito,* BOVENTI FRANCESCA, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree.

2003 -2004

Master of Science

- Maintenance of the university buildings. Criteria and procedures for the preparation of the maintenance plan for the building Viganò at the Politecnico di Milano, *(Manutenzione degli edifici universitari. Criteri e procedure per la stesura del piano di manutenzione per l'edificio Viganò presso il Politecnico di Milano),* PROVERBIO ELENA, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree. *(*The thesis was the winner of the award "Professor Parvopassu" assigned by CNIM National Committee in 2005 Maintenance*);*
- Information and management of public real estate. Tools and procedures for a gradual process of acquiring knowledge for scheduled maintenance *(Informazione e gestione di patrimoni immobiliari pubblici. Strumenti e procedure per un graduale percorso di acquisizione delle conoscenze per la manutenzione programmata),* MAFFIOLETTI SIMONA, Faculty of Architecture, Urban Planning and Environment, Architecture Science degree.
- The siege reversible. Design of a system for entertainment: a camp transportable, transformable, temporary beside the old castle, (*L'assedio reversibile. Progetto di un sistema per l'intrattenimento: un accampamento trasportabile, trasformabile, temporaneo ai piedi del castello)* FERRI LUCA, Faculty of Architecture, Urban Planning and Environment, Architecture Science degree.
- Modular, light, mobile. Service modules for temporary installations *(Modulare, leggero, mobile. Moduli di servizio per installazioni temporanee),* LEONE SERGIO, Faculty of Architecture, Urban Planning and Environment, Architecture Science degree.

Bachelor of Science

- Considerations on the concepts of continuity and discontinuity (*Spunti di riflessione sui concetti di continuità e discontinuità),* VALOTI SILVIA, Faculty of Architecture, Urban Planning and Environment , Architecture Science Degree.
- *The table of the tables, La tela delle tele,* GIOBBI EMILIO, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree.
- *Housing,* FUOCO FRANCESCO, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree.
- *Representation (La rappresentazione),* MARCELLO CINZIA, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree.
- *Architecture, person, society (Architettura, soggetto, società),* DEL MARCO MATTEO, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree.
- Read write compose: a comparison with France *(Leggere scrivere, comporre: un confronto con la Francia,* SEPPI GIOVANNA, Faculty of Architecture, Urban Planning and Environment, Architecture Science Degree.

2002-2003

Master of Science Five years single cycle

- Maintenability of the building envelop. Ventilated façade project for easy maintenance (*Manutenibilità dell'involucro edilizio. Progetto di facciata ventilata a manutenzione facilitate*); BAIO MICHELA, BETTONI SONIA, Faculty of Architecture, Urban Planning and Environment .

2001-2002

Master of Science Five years single cycle

- The Global Service for building maintenance: definition and control of performance results (*Il Global Service per la manutenzione edilizia: definizione e controllo dei risultati prestazionali*), CAVALLARI LUCA, OIOLI ANDREA, Faculty of Architecture, Urban Planning and Environment.
- Property management: economic and technical assessment of maintainability: the case of the office buildings (*Gestione immobiliare: valutazione tecnico economica della manutenibilita' : il caso degli edifici direzionali*) COLASUONNO MARCO, Faculty of Architecture, Urban Planning and Environment.
- Maintenance and public assets: instruments, procedures and case studies (*Manutenzione e opere pubbliche : strumenti, procedure e casi studio*) CAMPOLO LAURA, Faculty of Architecture, Urban Planning and Environment.

1999-2000

Master of Science Five years Scientific coordinator single cycle

- The technical Utopia as a stimulus for innovation (*L'utopia tecnica quale vettore dell'innovazione*); PEDRAZZOLI IVANA, Faculty of Architecture.

9. CURRENT AND PAST ROLES IN PH.D. BOARDS WITHIN POLITECNICO DI MILANO

9.1 PH.D THESIS SUPERVISION AND TUTORING

2016

- Tutor of the Ph.D. student BONANOMI MARCELLA within the ABC Ph.D. course, working on the subject of change and risk management in design teams introducing BIM methodologies and tools.
- Tutor of the Ph.D. student NAZLY ATTA within the ABC Ph.D. course, working on the subject of BIG DATA and IoT (Internet of Things) in building and urban FM services.
- Tutor of the Ph.D. student MOSTAFA ABBASI within the TEPAC Ph.D. course, working on the subject of lean construction.

2012-2015

- Tutor for the Ph.D. thesis "From waste to product. Production cycles, industrial ecology and impacts on the territory. The recycle of scraps of production in the chain of natural stone " . Thesis discussed by MIGLIORE MARCO within the TEPAC Ph.D. course. (*Dallo scarto al prodotto. Cicli produttivi, ecologia industriale e impatti sul territorio. La valorizzazione degli scarti della filiera produttiva della pietra naturale*)

2009-2012

- Tutor for the Ph.D. thesis “Risk management through the building process”. Thesis discussed by MARTANI CLAUDIO within the TEPAC Ph.D. course (in English language).
- Tutor for the Ph.D. thesis “Energy, material, time. Retrofit strategies in a life cycle assessment”. Thesis discussed by DUCOLI CHIARA within the TEPAC Ph.D. course (in English language).

2005-2008

- Tutor for the Ph.D. thesis “Maintenance and criticality '. Criteria, methods and tools for the management of the maintenance process”. Thesis discussed by PROVERBIO ELENA within the PMR Ph.D. course (*Manutenzione e criticita'. Criteri, metodi e strumenti per la gestione del processo manutentivo*).

2001-2004

- Tutor for the Ph.D. thesis “Real estate maintenance services - the measure of the "success" : development of a control and valuation system on the building maintenance services”. Thesis discussed by ALESSIA DI VIRGILIO within the PMR Ph.D. course (the thesis was the winner of the award “Parvopassu” assigned by CNIM National Maintenance Committee in 2005).

10. TEACHING ACTIVITIES IN SPECIALIZING MASTERS AND POST GRADUATE COURSES AND PROFESSIONAL TRAINING

10.1 TEACHING ACTIVITIES IN POST GRADUATE COURSES

2004 – 2016 Teacher on the topics "Building inventory and information systems" and "Planned building maintenance" in the second level Specializing Master "Master in Public Procurement and Contracts" of Politecnico di Milano (Director of the Master Prof. A. CABIDDU).

2011 – 2012 Teacher on the topic of "The building to be kept alive" within the series of refresher courses "The diocesan client" organized by CEI (Italian Episcopal Conference).

2012 Teacher on the topic "Management of data and information about real estate" within the cycle of technical seminars "Management of public real estate" (State Property Agency Agenzia del Demanio).

2004 Teacher on the topic of acquisition of information for the planning of building maintenance within post graduate course "The project manager of public works " organized by the Business School of the University SDA Bocconi.

2007 Teacher on the topic of acquisition of information for the planning of building maintenance within post graduate course "The project manager of public works" organized by the Business School of the University SDA Bocconi.

2008 Teacher on the topic of acquisition of information for the planning of building maintenance within post graduate course "The project manager of public works" organized by the Business School of the University SDA Bocconi.

2008 - 2013 Teacher on the topic "Planned building maintenance" within the "MASTER in Real Estate Finance and Development - Part Time" (Director of the Master prof. S. MATTIA).

2008 Teacher on the topic "Planned building maintenance and life cycle cost assessment" within the Master Real Estate - 3^ edition (master in partnership MIP Politecnico di Milano, SDA Bocconi).

2008 Teacher on the topic "Due Diligence Real Estate; Dossier of the building; Maintenance registry" within the post graduate course AECM3 - Management and quality control in construction firms (director prof. B. Daniotti).

2006 Teacher on the topic of Planned maintenance within the post graduate Executive course "Facility Management and property management" (master organized by MIP Politecnico di Milano, responsible prof. O.Tronconi)

2005 Teacher on the topic of basic IT tools within the Level II Specializing Master "The planned conservation designer " organized at the Politecnico di Milano (Master director prof. S. Della Torre).

2004 Teacher on the topics: "Product and process: the scenario of complexity", "Techniques, tools and application areas of preliminary design stage", "Design for maintenance: techniques and instruments for the maintainability of the project", "Maintenance plan and manual" within the second level Specializing Master "Integrated strategic design for the development of architectural, urban and environmental resources" of Politecnico di Milano (Director of the Master Prof. S.Crotti).

2004 Teacher on the topic of "Planned maintenance" within the II level Specializing Master "Restoration of the modern architecture. Appraisal and design for the protection and the restoration of the twentieth century architecture "(Director of the Master M.A. Crippa).

2003 Teacher on the topics of "Standards for planned maintenance" and of "The maintenance plan"

within the II level Specializing Master "Management of durability and maintenance in the building process" organized at the Polytechnic Milan (Master Director prof. P.N.Maggi).

2002 Planning and managing the training course "The information system for the management of the Politechnic of Milan Real estate" for the staff of the Technical office of the Politecnico di Milano. During the course gave several lectures on the topic of information systems for real estate.

1989-1992 Planning and managing the post graduate courses " CAAD and Architecture. Mapping and architectural design with graphics application systems for pc" within the programme of continuing education of the Politecnico di Milano. During the course gave cicle of lectures.

11. CURRENT AND PAST RELEVANT ROLES IN RESEARCH ACTIVITIES WITHIN POLITECNICO DI MILANO

11.1 RESEARCH "MAINTENANCE PROCESSES FOR WORSHIP BUILDINGS" Research funded by CEI (Conferenza Episcopale Italiana_ Conference of Bishops)

Role: Scientific responsible
Period: 2012-2015

Objectives
The aim of the research is to develop and to check a system of support tools, useful for clients, for designers and for maintenance managers of worship buildings. The system consists in guidelines, procedures and evaluation tools, graduate according to the different steps of design process and carried out in order to assume and to verify the requirement of maintainability and to apply strategies of planned maintenance.

Field of application
The research considers new and less than 50 years old religious buildings.

The research methodology
The research activities have been carried out according to some main steps:
1. Investigations. The investigations have focused on different aspects:
   - the client's needs (the National Service for the Religious Buildings of the Italian Conference of Bishops;
   - the client's organization in terms of the launch of the design (calls for tenders, awards of design, design specifications documents, pilot projects, briefing, etc..) and with regard to the maintenance management;
   - the characteristics of the building stock analysed in the research. In particular, the investigation focused on techno-typological characteristics of the buildings, classified in relation to age and construction techniques, and to the major and most frequent degradations;
   - the method of submission of the design documents and design deliverables, at different scales;
2. Search for references for the development of tools. In particular, the analysis led to the identification of: the most meaningful contributions from literature; the adoption of a set of reference UNI standard; the selection of good practices;
3. Definition of the structure of a system based on a knowledge base and several integrated tools;
4. Development and implementation of the knowledge base;
5. Development of every single tool;
7. Tests on case studies;
8. Development of a software application.

Outcomes
The research has developed a system of maintenance oriented tools aiming to support both the design phase and the planned maintenance activities.
The system is organized on a knowledge base. It collects a set of information concerning both the most frequent construction techniques of the building stock and the main maintenance activities. In particular, the information are organised according to various, interacting, categories: the construction techniques of the building elements, the most recurrent degradations and failures modes (descriptions, causes, probability, case studies), the main maintenance activities (cleaning, inspections, corrective and predictive maintenance), the various maintenance equipment that can be used (dimensions, weight, operative area, type of energy, etc.), the spaces necessary for performing maintenance activities in accordance with the various maintenance equipment.
The knowledge base feeds all the maintenance oriented tools with information. The tools are:
- Brief document for maintainability requirement. This document has the aim to define all the requests that the Client should require for a maintenance oriented project. The brief document is articulated in two sections: the first section regards requests that have to be met in the phase of concept and scheme design; the second section regards requests that have to be considered in the phase of detailed design;
- Design Guidelines. The guidelines can be considered as a sort of handbook for the designer who receives the brief documents. It is composed of a set of suggestions, organized according to each single request;
- Design review tool. This tool can be use both by the designer to self-assess his proposals and by the Client to

evaluate and to validate the project. It consists in a set of questions, rising from the different chapters of the brief documents, to which the evaluator can answer analysing the project with the support of the information collected in the knowledge base. The answers, elaborated through a spread sheet, are linked to standard values that express the level of maintainability;

- Set of procedures, supported by a standardized format, for the drafting and the management of manuals and maintenance plans.

At present the system is being developed as a software application.

Connected publications (SEE par.13.1-13.5)

b.2, d.7, d.9, d.10, d.11, e.4, e.10, e.11

11.2 RESEARCH "KNOWLEDGE MANAGEMENT IN PROCESSES OF PLANNED MAINTENANCE AND FACILITY MANAGEMENT" - PRIN RESEARCH (SCIENTIFIC RESEARCH PROGRAM OF RELEVANT NATIONAL INTEREST) "BUILT HERITAGE INFORMATION MODELLING/MANAGEMENT – BHIMM" (SCIENTIFIC COORDINATOR PROF. S. DELLA TORRE)

Research funded by MIUR (Italian Ministry of Education, Universities and Research).

Role: Responsible of the Task Competence
Period: 2012-2015

Objectives:

The main goal of the research project is to standardize a datasheet template referring to operations and maintenance phase to enable information exchange in a Building Information Modelling (BIM) environment. This data scheme should define for each building element a minimum dataset as necessary to multiple activities which characterizes facility management phase (maintenance scheduling, space management, spare parts management, etc.). In particular, research objectives can be described as it follows:

- Definition of a data scheme together with its compilation protocol (information taxonomy) for exchanging data related to FM activities in a BIM environment;
- Elaboration of a datasheet template for each construction product/building element in order to enhance the information lifecycle management of data concerning FM activities;
- Validation of the developed datasheet template in a BIM environment.

Field of application:

The research deals with Facility Management services and building maintenance managed within a BIM environment.

The research methodology:

In order to address the aforementioned goals, the research activity has faced the following steps:

- Defining the reference scenario by analysing existing BIM-Objects Information Requirements and data standards;
- Adopting a building registry and a maintenance plan prototype as a primary source of information to define which are the attributes useful to FM activities and processes;
- Defining which are the informational attributes to be included in the datasets as useful for FM activities by analysing the adopted maintenance plan prototype;
- Codifying the information previously identified in the maintenance plan prototype in datasets compatibly organized with the analysed BIM-Objects Information Requirements and data standards;
- Selecting and adopting a BIM software;
- Defining the information taxonomy by identifying which information included in the developed datasets can be automatically provided by the BIM software as element properties (i.e. geometric information) and by existing BIM-Objects Information Requirements and data standards (i.e. material, manufacturer, model, product page URL, etc.);
- Identifying possible sources (i.e. bill of quantities, abacus building components, manufacturer documentation), referring to different phases of the building process, for each informative attribute of the dataset which is not automatically provided neither by BIM software nor existing data standards;
- Transferring and representing the case study building in BIM environment to test and validate the developed datasheet template.

Outcomes:

The research project has developed a datasheet template aiming at satisfying the informational needs of the FM activities and processes, focusing in particular on the information needed to develop a maintenance manual. The proposed datasheet template has been developed by bringing together parameters taken from the different BIM-Objects Information Requirements and data standards which have been taken as the reference scenario for the research project.
Through the adoption of this datasheet template, it would be possible:

- An implementation of current BIM-Objects Information Requirements and data standards which, for example, are adopted by the existing BIM-Object libraries;

- A simulation of Building Operating conditions at the very early stage of the building design. In this way, the developed data template may be used by all the actors of the construction process as a decision support tool concerning the facility management phase of a building;
- A definition of possible datasets to implement interoperable overlay between existing BIM software and Facilities Information Systems.

Connected publications (SEE par.13.1-13.5)

a.1, d.2, e.5, e.6, e.7

11.3 RESEARCH "THE USEFULNESS OF THE USELESS. CROSS-SECTOR RECYCLE OF WASTE IN CONSTRUCTION".

Research F.A.R.B. (Finanziamento di Ateneo per la Ricerca di Base – University funding for basic research) funded by Politecnico di Milano.

Role: Scientific responsible
Period: 2013-2014

Objectives:
Starting from the European Directives, Decisions and Recommendations about waste and from the awareness that the pre-consumer scraps represent a valuable potential for reuse and recycling, the general starting objectives are:

- Reduction of the consumption of natural raw resources;
- Identification of possible reuse of the scraps as raw material;
- Valorisation of scraps and waste;
- Creation of companies network (industrial ecology and circular economy);
- Reduction of the environmental profile of the product;
- Reduction of the industrial impact on the territory;
- Creation of a simplified system of environmental evaluation of the possible reuse scenarios.

In particular, the main goals of the research project are the identification of possible strategies and the development of support tools useful for promoting the cross-sectorial recovery and valorisation of scraps and waste, deriving from different sectors, as raw materials for the supply chains of the building sector.

Field of application:
The research deals with Waste Management, Waste Prevention, Environmental Preservation and Circular Economy.

The research methodology:
In order to address the aforementioned goals, the research activity has faced the following steps:

- Definition of the specific background (national and international) referring to the reuse/recycling of waste and scraps;
- Study of different supply chains (not only related to the building sector), in order to identify scraps and waste useful such as secondary raw material;
- Analysis of waste/scraps coming from various sectors and production processes (flows -input and output- of materials, typologies and the features);
- Developing of a univocal method for the identification and the classification of waste and scraps (taxonomy) resulting from various production chains;
- Developing of a univocal method for the identification of the manufacturing phases (taxonomy);
- Proposal of a matrix (taxonomy) in which it is possible to identify, quantify, trace and compare the various kinds of waste;
- Proposal of possible scenarios for the reuse and the valorisation of waste and scraps, based on the intersection of flows of materials summarized in the taxonomy;
- Elaboration of a system to assess (from the environmental point of view) the proposed scenarios;
- Validation of the developed method through the application on a sample.

Outcomes:
The research project has developed a matrix in which are collected useful information for the activation of possible synergies between companies (sharing of scraps to be reused or recycled). The proposed matrix template has been developed by combining different contributions: NACE Rev. 2 - Statistical classification of economic activities and CER catalogue for the identification of scraps.

Through the adoption of this matrix template, it would be possible:

- To map, describe and quantify the waste coming from various sectors in relation to geographical areas;
- To draft possible scenarios of cross-sector synergies for the valorisation of scraps;
- To propose new production cycles in symbiosis with the existing ones.

Connected publications (SEE par.13.1-13.5)
d.4, d.5, d.6, e.2, e.8

11.4 RESEARCH "MONITORING AND EVALUATION OF CONTRACTS IN GLOBAL SERVICE FOR THE MANAGEMENT OF UNIVERSITY BUILDINGS"
Research funded by ATE (Area Tecnico Edilizia -Technical Area) of the Politecnico di Milano

Role: Scientific responsible
Period: 2012-present

Objectives:
The main goal of the research is to develop, test and implement procedures and tools for the monitoring and the evaluation of the contracts in Global Service for the management of university residences for students. It's a long duration research whose aim is to increase the quality of services to students over time by constant activities of monitoring, analysis of feed back information, improving of tools.
In particular, the research objectives can be described as it follows:

- Definition of the parameters and the modalities for the monitoring of various kinds of FM services;
- Definition of the modalities of reporting and recording inspection feed back data;
- Developing and testing sets of procedures;
- Development of a data base useful for the drafting of the new contracts for FM services and for the design of new residences.

Field of application:
Global Services contracts in the field of university residences.

The research methodology:
The research activity is being facing the following steps:

- Deep analysis of the existing tenders for the university residences of the Politecnico Di Milano;
- Analysis and comparison of best practices of other university residences in Italy and in Europe;
- Assumption of three case studies in the real estate of Politecnico di Milano (Daniel's hotel, Leonardo da Vinci and A.Loos residences) in order to: define modalities of monitoring, evaluate the students' satisfaction about the services, identify the basic information necessary to describe the state of the services, collect feed back information about failures and maintenance activities;
- Proposals of integration of the tenders of the university residences of the Politecnico Di Milano (command center, documents, basic information, monitoring and checking activities, etc.);
- Writing and testing of procedures for monitoring;
- Development and implementation of a data base.

Outcomes:
Within a strategy of continuous improvement focusing on the compliance with the regulations, the guests' needs and the policies of the Politecnico, the research is developing several outcomes, constantly applied and tested:

- An archive of the maintenance activities, of the degradations and of the failure modes;
- The methodology and the tool for the monitoring activities and for creating reports useful for checking the application of the contract;
- The methodology for the definition of the service levels in relation to the conditions of the real estate;
- The methodology and the tool for the execution of the surveys on the performance of the services;
- The methodology and the tool for monitoring over time the students' satisfaction and the criticalities in the services delivery;
- The procedures and the format of a maintenance plan coherent with the existing contract and with the model of "average maintenance state" implemented for the management of the residence;
- The study of the requirements of an information system responding to the requirements of the contract and to the characteristics of the Real Estate.

Connected publications (SEE par.13.1-13.5)
b.4, d.1, d.3, e.12, e.15

11.5 RESEARCH "Monument to Vittorio Emanuele II in Rome. Cognitive activities preparatory for the development of a maintenance plan of the Vittoriano monument Research funded by the Italian Ministry of Heritage and Culture.

Role: Proposer and member of working group
Period: 2010-2011

Objectives:
Objective of the research is the set up of a prototype of maintenance plan for a monumental building with high complexity and hosting multiple functions as the Monument to Vittorio Emanuele II in Rome (Vittoriano). Together with the maintenance plan, the research has the objective to propose the structure of a command centre, that is a single centre of coordination of the activities, the monitoring processes, and the management of information flows.
For the development of the prototype of maintenance plan, the following objectives have been defined:

- To pursue the preservation of the monument through the prevention of the degradation with inspection activities and planned maintenance;
- To pursue scale economies in the procurement of work and services;
- To rationalize the whole system of management;
- To obtain a centralized information management and to increase knowledge through an information system constantly updated.

Field of application: Maintenance Management of cultural heritage.

The research methodology:
In order to address the aforementioned goals, the research activity has faced the following steps:

- Collection of available documentation concerning the monument and proposal of cataloguing criteria for the traceability and organisation into a building management registry;
- Preparation of the reference framework of applicable rules and standards;
- Set up of a registry system for the unambiguous classification and coding of spaces and technical elements;
- Preparation of a sheets system which, according the registry system rules, allows to collect the information in a univocal way;
- On site inspection for a technical description and for a general condition assessment of the building;
- Processing, accordingly to the rules defined in the registry system, of the information collected during the on site inspection with the objective to increase the base of knowledge about the building;
- Proposal of a structure of a planned maintenance plan;
- Meta-design of the organization and the main workflows of the command centre.

Outcomes:
The main outcomes of the research are as follows:

- Definition of a coding and classification system of the technical elements and components for a monumental building (including non moveable artworks);
- Survey and classification of the systems, elements and components of the building under study;
- Preparation of a prototype for a maintenance plan for the monumental building;
- Definition of the main requirements and criteria to establish a command centre.

Connected publications (SEE par.13.1-13.5)
b.5, b.6

11.6 RESEARCH "DEVELOPMENT OF A PROTOTYPE OF MAINTENANCE PLAN" Research funded by ATE (Area Tecnico Edilizia -Technical Area) of the Politechnic of Milan

Role: Scientific responsible
Period: 2010-2012

Objectives:
The research starts from the needs of ATE (Area Tecnico Edilizia_ TECHNICAL AREA) of Politecnico di Milano :

- To control the implementation of complex tasks of property & facility management (global service) (mixed contracts with characteristics of PPP, i.e. Public Private Partnership);
- To be able to manage design processes in which design documents, consisting of drawings and technical reports, can be arranged keeping in mind the cognitive needs related to maintenance processes;
- To develop a registry for the buildings that is unique for the entire building process (from design to maintenance and operations phases).

In order to pursue these goals, the research has the aim to develop a prototype of maintenance plan, useful to derive a procedure for developing specific maintenance plans, to define the basic information to be collected for the plan and to identify the rules for breaking down and coding building elements and spaces.

Field of application:
Design and maintenance of university buildings.

The research methodology:
The research has been developed through a series of steps:

- An investigation in order to identify a general framework of the maintenance plan through the analysis of national and international regulations, standards, best practices;
- Analisys of the characteristics of the university real estate;
- Development of a prototype maintenance plan;
- Testing of the plan on two university residences ("project 338" of Politecnico di Milano);
- Definition of the basic information to be collected to start the plan;
- Definition of the rules for collecting, breaking down and coding information.

Outcomes:
The research project has developed:

- a prototype maintenance plan which has been integrated within the project "Information Management System of the Public Work" of ATE, aiming at the re-engineering of the aspects related to the knowledge and understanding of the processes of design, construction, inspection and testing;
- a set of procedure dealing with the rules for collecting, breaking down and coding information;
- a data base concerning information useful for supporting a "maintenance oriented" design and for the management of maintenance activities for university residences.

The research outcomes have been used for the development of new invitations to tenders.

Connected publications (SEE par.13.1-13.5)
a.2, b.4, b.8, b.9, b.10, c.1, e.15, e.17, e.19, e.20, e.23, e.25

11.7 RESEARCH "DEVELOPMENT OF A QUALITY TECHNICAL SPECIFICATION FOR PROJECTS PROMOTED, DESIGNED AND CONSTRUCTED BY THE CONSORTIUM CASEDOQ"

Research funded by Consortium for quality housing in the Bergamo valley "Consorzio per l'edilizia di qualità della pianura bergamasca").

Role: Scientific coordinator
Period: 2010-2014

Objectives:
The objective of the research is to establish an assessment tool to measure the quality offered by a housing consortium during the different stages of the whole construction process: planning, design, presales activities, construction, commissioning, handover, after-sales and maintenance services. The starting hypothesis is that the quality of housing should be seen not only as technical quality of the constructed building but also as quality of the process that leads to the delivery of the constructed building to the inhabitants, including the delivery of services in the occupancy stage.
The tool is based on a set of performance indicators and is characterized by three goals:

- to use the tool as a common reference for each operator involved in the supply chain in order to assure the awareness of the quality objectives to be reached within the construction process;
- to communicate in detail, and in an understandable way, to the customers and to the final users of the building the quality aspects that the supply chain will provide;
- to propose a quality technical specification for interventions shared by operators of the consortium and buyers/users.

Field of application:
The research deals with supply chain management and housing quality control.

The research methodology:
The research activities have been carried out according to some main stages:

- An investigation in order to identify a general framework for the assessment of the overall quality of a residential building considering the life cycle of the project from project initiation to the handover and operation of the building;
- A first survey of the available methods and tools for sustainability and quality assessment with the identification of the main assessment areas, used by the different methods and tools to define the sustainability/quality of the buildings, and the analysis (criteria and algorithms) of the performance indicators;
- Identification of the quality areas to be assumed as the basis for the assessment model;
- Definition of a minimum number of performance indicators for each quality area;
- Identification of reference performance levels to classify the projects according to three levels or classes (compliance level, basic level, plus level);
- Test on same sample cases.

Outcomes:
The research project has developed a quality assessment tool based on four quality areas and on a set of 96 performance indicators, that are distributed in the different quality areas. The areas are:

- organization of the developer: the purpose of this area is to explain to the customer the organization of the consortium Casedoq with indices and qualitative information directly available through the specification of quality.
- housing quality: the objective of this area of quality is to make the customer aware of the performance achieved by the single accommodation in terms of performance, through the evaluation of indicators and benchmarks that can describe with clarity and simplicity these results.
- quality of settlement: the evaluation covering the settlement level has the objective to demonstrate how careful planning are addressed, at the same time to the individual housing, to the project in general and to its spatial location in the territory.
- services for the customer: the purpose of this area is to identify a package of services that the consortium could offer to the customers during the occupancy period of the buildings (for instance maintenance services) in order to achieve customer loyalty and customer satisfaction.

The performance indicators concern:

- economic (the economic sustainability of the project);

- environmental (indicator of the environmental sustainability of the project);
- performance&services (social sustainability of the project assumed as limited to the social component related to the inhabitants of the building).

Connected publications (SEE par.13.1-13.5)

d.8

11.8 RESEARCH "ANALYSIS OF THE ENERGY BEHAVIOUR OF TRADE FAIRS IN EUROPE" Research funded by EMECA "European Major Exhibition Centres Association"

Role: Scientific coordinator
Period: 2010-2011

Objectives:
The research started from the assumption that the exhibition centres are complex buildings with some weaknesses in terms of energy behaviour, including: high values of energy consumptions and embodied energy, spatial/functional/technological obsolescence, operational profiles. With the aim to obtain general recommendations for construction, refurbishment and operations and maintenance, a study on the Energy Efficiency of exemplary exhibition halls has been developed by Politecnico at EMECA Members' venues. The initiative measured the properties and energy consumption of representative fair and exhibition venues in Europe. The main focus was the relationship between construction materials and facade techniques and the energy consumption for space heating and cooling.

Field of application:
Energy simulation models, energy efficiency of existing buildings, criticalities of building envelops in term of energy performance of exhibition halls.

The research methodology:
The research activity is being facing the following main steps:

- The first step has been the identification of a representative hall (for both geometric characteristics and construction techniques), a "sample building" for each exhibition centres;
- Secondly, it has been necessary to collect all the information about the characteristics of the envelope of the sample building;
- The next stage was the elaboration and integration of all the data received concerning the geometrical and thermal-physical description of the envelope.
- The last step has been, for each exhibition centre, the construction of a three-dimensional model (using the software DesignBuilder) also described in a thermal-physical level.
- The result has been formalized in the analysis of the critical parts of the envelope, that could be improved in terms of energy performance.

Outcomes:
The main outcomes of the research are as follows:

- A three dimensional model of a sample building for 4 exhibition centres, where the building is described at the geometric and thermal-physical level;
- Preliminary energy assessment, from which it will be possible to understand what are the most critical parts of the envelope and their contribution, compared to the whole envelope, to the energy performance of the building;
- Highlight of the most promising or urgent refurbishment and improvement strategies of the energy performances of the analysed building and of similar buildings in the same compound.

Connected publications (SEE par.13.1-13.5)
d.13, d.16, e.16

11.9 RESEARCH "STUDY OF TECHNOLOGICAL ALTERNATIVES FOR IMPROVING THE ENERGY PERFORMANCE OF BUILDING ENVELOPES OF BUILDINGS OF THE EXHIBITION CENTER IN FAIR MILANO IN RHO" Research funded by FIERA MILANO SPA

Role: Scientific responsible
Period: 2009-2011

Objectives:
The objective of the research is to set up a model and a procedure for the assessment – with the use of a dynamic simulation tool - of the energy savings that could be obtained with the implementation of energy requalification actions on the buildings operated by Fiera Milano company.

Field of application:
Dynamic Energy simulation models, energy efficiency of existing buildings, exhibition hall.

The research methodology:
The research activity is being facing the following main steps:

- Set up of a geometrical 3d model of the main exhibition hall of the Milano international trade fair;
- First running of the simulation tool (a dynamic simulation tool has been used: the software Energyplus) in order to determine the energy demand of the hall during the different exhibitions planned over the reference year;
- Calibration of the model and if the simulation tool using the recorder data about energy consumption during the exhibitions;
- Installing thermal data logger in the investigated hall in order to trace, on an hourly basis, the actual temperatures reached during the exhibitions in the different days in order to minimize the difference between the energy demand calculated with the simulation tool and the measured energy demand;
- Identification of different energy requalification strategies and techniques applicable to the studied building;
- Determination of the possible savings and analysis of their effects even in a LCA perspective comparing the energy savings with the embedded energy of the different possible techniques.

Outcomes:
The research project has developed a procedure for the set up and calibration, with reference to actual and measured energy consumption data, of a model for the dynamic simulation of the energy performance of exhibition buildings characterized by large volumes, high internal height, discontinuous operation. A second outcome concerns the set up of a model for the comparison of different alternatives of energy performance improvement based not only on the economic criteria (payback time, internal rate of return, net present value, …) but also on the sustainability issues. In this perspective, a method for the analysis of the alternatives considering also the embedded energy, in a life cycle perspective, has been defined and tested

Connected publications (SEE par.13.1-13.5)
d.13, d.16, e.16

11.10 RESEARCH "A RESEARCH PROJECT AIMING AT DEFINING STRATEGIES OF ENHANCEMENT OF A PUBLIC REAL ESTATE THROUGH TECHNOLOGICAL REFURBISHING"
Research funded by EXITone company

Role: Scientific responsible

Period: 2009 - 2010

Objectives:
The aim of the research is to propose procedures and tools with the aim to support knowledge and decisions in order to gain energy rehabilitation strategies, through the use of few key information related to buildings.
The research has the aim of improving efficiency and effectiveness of processes through the coordination of inventory activities, information management and energy rehabilitation strategies.
The purpose is to provide a support to permit the decision makers in the field of public real estate a double action:

- the assessment of the propensity of the residential public buildings (considering in particular the building envelope) to undergo refurbishment strategies based on the insertion and the integration of systems for the production of renewable energy. The assessment is based on information extracted from the real estate inventory;
- the comparison/integration of the outcomes of this assessment with the content of the energy performance certification.

Field of application: Public Real Estate

The research methodology:
The research has been developed through a series of steps:

- Analysis of best practices about the procedures for developing real estate inventories and analysis of the categories of information gathered;
- Proposal of unification of information in order to adopt a unique database. The unique database is obtained through the comparison of the information gathered by the real estate inventory with the minimum information necessary to define different strategies for energy refurbishment and with the information typically collected in the process of energy certification;
- Implementation of a database concerning technical solutions for efficiency upgrade (with emphasis on innovative products and best practices);
- Development of a system of filters, based on real estate inventory data, to assess both the propensity of buildings to various types of re-design and re-qualification intervention;
- Definition of a set of indicators, extractable from real estate inventory data (e.g. age, state of the technical elements and components, orientation, etc..), able to support the assessment of the appropriateness or priority of refurbishment, through the application of the filter system.

Outcomes:
The research proposes procedures and tools with the aim to support knowledge management and decisions making in order to develop energy rehabilitation strategies, through the use of few key information related to buildings. The Outcomes are:

- procedures supporting decisions for technological renewal oriented to improvements of energy behaviours in the field of Residential Public Real Estate;
- Knowledge base collecting data from inventory processes;
- Integration of energy certification outcomes.

The proposed procedures allow the selection of the most suitable actions for energy refurbishing according to few basic information and in particular:

- the typological and technological characteristics of the buildings;
- the general information on the characteristics of the buildings;
- the strategies that the manager intends to implement.

The proposed procedures have the aim not only of providing scenarios of achievable strategies and choices about types of intervention, but also of representing a base of knowledge about characteristics and constraint factors of typical interventions for energy rehabilitation.

Connected publications (SEE par.13.1-13.5)
b.12, d.14

11.11 RESEARCH "DEVELOPMENT OF A MODEL FOR ESTIMATING LONG-TERM CEMENT DEMAND IN ITALY"

Research funded by AITEC (Technical and Economical Italian Association of Cement association of Italian cement manufacturer)

Role: Scientific coordinator
Period: 2004-2006

Objectives:

The research addresses the issue of forecasting, on the medium and long term, of the cement demand in Italy and has two objectives which are closely linked:
1. the development, testing and validation of a model aimed at quantifying the demand for cement - in relation to different context variables (technical, social, legal, territorial, economic, macro-economic, financial, political, etc.) - on a medium-term time period of the order of magnitude of ten years;
2. the determination of the amount of cement required by the Italian construction market during the next decade, articulable according to multiple keys of reading (productive sector, types of products, building or infrastructure types, etc.) and updated in relation to different future scenarios possible.

Field of application:
Cement production and tool for the demand forecast.

The research methodology:
The research activity has followed the above main steps:

- typological and technical analysis with the objective to develop techno-typological schemes of construction works - building or infrastructure - as representative as possible for the different sectors of the construction activities;
- socio-economic analysis aimed to predict the trend over time (in terms of produced quantity) of construction activity in the various sectors, starting from the assumption of few indicators and historical data from reliable statistical sources and - when available - from planning documents and estimates;
- determination of the "elementary technical coefficients", i.e. indicators of the cement content for physical units (in volume) of the different building typologies considered [normally expressed in $kg_{cement}/cm_{building}$]. This is a "key" item that allows to connect, in variable and dynamic way, forecasts concerning the amount of construction activity (cm to be realized by type) with different techno-typological schemes;
- Determination (even with the involvement of experts in Delphi analysis) of the possible variations in the technical coefficients that could be caused for instance by changing in standards and laws, evolution of design trends, etc.
- Breakdown of the overall turnover of the construction industry into specific technical and typological classes (single family building, multi-storey building, commercial, office, ...) and determination of the cement demand for each sub sector of the construction industry; the breakdown can be developed by type of building or by type of construction techniques (on site, precast, industrialized) or by type of sub-system (envelope, roofing, partitions, slabs, ...);
- Breakdown of the forecasts concerning industry turnover and construction volumes into the defined techno-typological classes in order to find the specific forecasts for each techno-typology
- Combination of the forecasts data for each techno-typology with the corresponding technical coefficient of cement use in order to determine the forecast of cement demand for each sector; this forecast is then adjusted considering the likely variations in the technical coefficients due to changing in the scenario conditions (new or modified laws, new trend in the markets like the expansion of wooden housing, ...).

Outcomes:

The research project has developed a forecasting model of the cement demand in Italy over the medium term in relation to general context variables (technical, social, legal, territorial, economic, macro-economic, financial, political, etc.); the model (called MO.P.A.C.C. Modello Previsionale di Attualizzazione dei Consumi di Cemento) has been applied to assess the forecast for the period 2000-2010. An other outcome of the research has been the set up of a framework allowing the analysis of the cement demand with a breakdown into categories and typologies of buildings and infrastructures (e.g. residential buildings: multi storey, single storey, single family, multi family, …; railroads: normal, high speed train, tunnels, viaducts, railway embankments,…); the framework is based on the determination of specific indexes (called "technical coefficients") for each category or typology.

11.12 RESEARCH "PROJECT OF AN INFORMATION SYSTEM FOR THE REGISTRY AND SCHEDULED MAINTENANCE OF THE REAL ESTATE OF THE POLITECNICO DI MILANO AND THE REALIZATION OF ITS COMPUTERIZED VERSION
Research funded by Politecnico di Milano according to Regulations AFC ex art. 4).

Role: Scientific coordinator
Period: 1999 - 2002

Objectives:
The aim of the research is to develop an innovative information system, able to:

- collect and organize the information concerning the Real Estate (spaces and technical elements);
- track and return in "real time" the state of consistency, of use and the performances of the Real estate of Politecnico di Milano;
- apply the principles of the UNI standard 10951:2001 Systems of information for the maintenance management of buildings. Guidelines;
- support the launch of new policies and strategies of planned maintenance;
- be adequate to the organizational and operative model of the technical department (Conservation and Building Services) of the university;
- be a prototype to be transferred and applied for the management of other university Real estate;
- be integrated by a system of procedures related to the modalities of inventory;
- be based on a registry system.

Field of application:
Information systems for real estate management.

The research methodology:
The research activity has followed the above main steps:

- Analysis of the Real estate, of the Client's needs and of the organization of the technical department;
- Market survey in the field of information systems;
- Definition of the logical structure of the system and the data model;
- Development of the computerized process;
- Development of the apparatus of data sheets necessary for the data collection;
- General inventory of the real estate collecting data through the data sheets;
- Surveys of the environmental and functional quality of the spaces for sample buildings;
- Surveys of the technical characteristics and performances of the technical elements for sample buildings;
- The implementation of the registry for same sample buildings;
- The creation of interfaces for the information system for the input and retrieval of data to facilitate and guide the consultation;
- Test and assessment of the prototype of information system and of the set of support tools.

Outcomes:

The research project has developed a prototype of information systems and a set of support tools and procedures for the management of Real Estate of Politecnico di Milano. The prototype has been gradually applied to the whole Real Estate.

Connected publications (SEE par.13.1-13.5)
a.2, a.4, b.23, b.29, d.36, d.38, e.30

11.13 RESEARCH "THE CONSERVATION OF URBAN QUALITY AND THE SYSTEM OF INTERVENTIONS ON THE EXISTING REAL ESTATE" Research funded by Chamber of Commerce of Milan

Role: Scientific coordinator
Period: 1999-2001

Objectives:

The research started from the assumption that the complexity of the urban services is due to the multiplicity of the physical and functional relationships that link them, to the plurality of information, to the large number of different operators often working without a coordination strategy.
Starting from this statement, the research aims to:

- define and apply a methodology to describe and manage the assets and the services engaged in the urban maintenance;
- transfer and adequately apply the general strategies and criteria of planned maintenance to urban maintenance
- define criteria for the development of inventories, registries and information systems for urban assets.

Field of application:
Inventories, registries and Information systems for Urban maintenance management.

The research methodology:
The research activity has followed the above main steps:

- Analysis of best practices about the procedures for developing inventories for urban assets and of literature;
- Assumption of a case-study (Milan);
- Definition and analysis of the categories of information engaged in urban maintenance management;
- Analysis of operators, working modalities, technical problems, skills, maintenance strategies, management models, input and output information nets, effects on urban quality;
- Proposal of a scheme of the main urban assets (taxonomy);
- Proposal of a scheme of the main urban services and of the related processes (taxonomy);
- Proposal of a matrix of correlation between urban assets and urban facility management services (taxonomy);
- Proposal of a scheme of maintenance plan for urban facility management services;
- Proposal of a scheme of information system for urban facility management services.

Outcomes:
The research project has developed:

- a matrix of correlation between urban assets and urban facility management services (taxonomy);
- a scheme of maintenance plan for urban facility management services;
- a scheme of information system for urban facility management services;
- a check-list for the control of quality services;
- an overview of skills and professions for urban maintenance management.

Connected publications (SEE par.13.1-13.5)
b.19, d.27, d.28, d.30, d.31, d.37, d.39

13. PUBBLICATIONS

13.1 BOOKS (a)

2015

a.1 *Knowledge Management and Information Tools for Building Maintenance and Facility Management***,** Springer, ISBN 978-3-319-23957-6 (with M. Bonanomi) (in English).

2011

a.2 *L'organizzazione delle informazioni nei servizi di gestione immobiliare,* Maggioli, Rimini, ISBN8838760993.

2006

a.3 *Manutenzione e recupero,* Alinea, Firenze, ISBN 88-8125-859-5 (with P.Gasparoli).

2003

a.4 *Il sistema informativo immobiliare. Il caso Politecnico di Milano,* Esselibri, Napoli. ISBN 88-513-0125-5.

2001

a.5 *Costruire con la terra,* Esselibri, Napoli ISBN 88-513-0005-4 (with B. Narici and G. Scudo).

1998

a.6 *La manutenzione in edilizia. Le coordinate di una nuova professione,* Maggioli, Rimini ISBN 88.387.1170.4.

1993

a.7 *Poiesis, L'informatica nel progetto euristico,* CittàStudi, Milano, ISBN 88-251-7066-1 (with M.Bertoldini and G. Nardi).

13.2 ESSAYS (b)

2016

b.1 "Recupero e manutenzione: la ricerca incontra le esigenze dei territori / Recovery and maintenance: the research complies with local needs", Lucarelli M.T., Mussinelli E.; Trombetta C., (Ed.) *Cluster in progress. La Tecnologia dell'architettura in rete per l'innovazione / The Architectural technology network for innovation*, Maggioli, Santarcangelo di Romagna, ISBN 9788891612496, pp. 246-257 (with M. R.Pinto) (in Italian and English).

2014

b.2 "Il Documento Preliminare alla Progettazione. Lo strumento della Committenza per orientare e controllare la qualità dell'intervento", in Paganin G. (Ed.), *Dalla terra al cielo. Concepire, realizzare, gestire edifici di culto*, Gangemi, Roma, 2014, pp. 111-151, ISBN 9788849228847.

2013

b.3 "Rivitalizzazione dei centri storici e progetto della conoscenza", in.Castagneto F., Fiore V., *Recupero valorizzazione manutenzione nei centri storici*, LetteraVentidue, Siracusa, 2013, pp.18-21, ISBN 9788862420846.

2012

b.4 "Informazione e ciclo di vita dell'opera pubblica (SgIOP)", in Alaimo G., Carbonari A.,et al. (Ed.), *The missing Brick: towards a 21-st century Built Environment Industry*, MAGGIOLI, Santarcangelo di Romagna, 2012, pp. 559-578, ISBN 8838761647 (with F.Vitola and G.Paganin) (in Italian and English).

2011

b.5 "Attivita' propedeutiche alla stesura di un piano di manutenzione e gestione", in Cecchi R. (Ed.), *Interventi per la tutela e la fruizione del patrimonio archeologico. Terzo rapporto*. Volume secondo, ELECTA MONDADORI, Milano, pp. 483-49, ISBN 9788837087371 (with Cecchi R., P.Gasparoli, G.Paganin).

b.6 "Attività propedeutiche alla stesura di un Piano di Manutenzione e Gestione per il Vittoriano, Roma" in Cecchi R., Gasparoli P. (Ed.), *La manutenzione programmata dei beni culturali edificati*, Alinea, Firenze, pp. 267-290, ISBN 9788860556684 (with Paganin G., Gasparoli P., Cecchi R.).

2010

b.7 "Il piano di manutenzione e la normativa volontaria: dalla norma quadro UNI 10604:1997 fino alla norma UNI 11257:2007 Linee di indirizzo per la realizzazione di piani e programmi di manutenzione", in Talamo C. (Ed.), *Procedimenti e metodi della manutenzione edilizia. Il piano di manutenzione*, Vol.II, Esselibri-Simone, Napoli, pp.19-29, ISBN 9788851306816.

b.8 "Il piano di manutenzione e il progetto di riqualificazione: il sistema delle relazioni", in Talamo C. (Ed.), *Procedimenti e metodi della manutenzione edilizia. Il piano di manutenzione*, Vol.II, Esselibri-Simone, Napoli, pp.43-58, ISBN 9788851306816 (with P.Gasparoli).

b.9 "Il piano di manutenzione come strumento di gestione della manutenzione: caratteristiche e ambiti di applicazione", in Talamo C. (Ed.), *Procedimenti e metodi della manutenzione edilizia. Il piano di manutenzione*, Vol.II, Esselibri-Simone, Napoli, pp.161-180, ISBN 9788851306816.

b.10 "La procedura di elaborazione del piano di manutenzione", in Talamo C. (Ed.), *Procedimenti e metodi della manutenzione edilizia. Il piano di manutenzione*, Vol.II, Esselibri-Simone, Napoli, pp.181-230, ISBN 9788851306816.

2009

b.11 "Costruzione di un sistema di supporto decisionale", in Bigotti E. (Ed.), *Il servizio abitativo sociale. Nuovi sistemi per valorizzare l'edilizia residenziale pubblica e promuovere le politiche dell'Housing Sociale*, il Sole24 ore, Milano, pp.137-156, ISBN 9788832473971 (with V.Cipriano, G.Paganin).

2008

b.12 "Conoscere per gestire: il contributo delle basi di dati nella pianificazione della manutenzione", in Talamo C. (Ed.), *La manutenzione degli edifici. 250 schede pratiche*, Sistemi Editoriali, Napoli, ISBN:9788851305314, Italian edition of Albano J.R., *La maintenance des bâtiments: en 250 fiches pratiques*.

b.13 "Corso di laurea Magistrale interfacoltà in "Gestione del Costruito", in Fiore V. (Ed.), *Manutenzione. Costruire le regole di un processo virtuoso*, LetteraVentidue, vol.II, Siracusa, pp.68-70, ISBN 978-88-6242-007-5, (with Molinari C., Paganin G.).

b.14 "Formazione per il servizio di manutenzione: analisi della domanda e dell'offerta formativa e modelli didattici innovativi", in Fiore V. (Ed.), *Manutenzione. Costruire le regole di un processo virtuoso*, LetteraVentidue, vol.II, Siracusa, pp.72-73, ISBN 978-88-6242-007-5., (with Molinari C., Paganin G., Curcio S., Balducci M.).

b.15 "La cultura della manutenzione nella formazione e nella ricerca. Esperienze di tesi di laurea presso la facoltà di Architettura e società del Politecnico di Milano", in Fiore V. (Ed.), *Manutenzione. Costruire le regole di un processo virtuoso*, LetteraVentidue, vol.II, Siracusa, pp.75-76, ISBN 978-88-6242-007-5 (with Molinari C., Paganin G., Proverbio E.).

2007

b.16 "Manutenzione e riqualificazione", in Fiore V. (Ed.), *La cultura della manutenzione nel progetto edilizio e urbano*, Lettera ventidue edizioni, Bagheria, 2007, pp. 38-45, ISBN 978-88-6242-000-6 (with Gasparoli P.).

b.17 "Strategie per la gestione: criteri e metodi per la definizione della criticità nella pianificazione della manutenzione", Fiore V. , (Ed.), *La cultura della manutenzione nel progetto edilizio e urbano*, Lettera ventidue edizioni, Bagheria, 2007, pp.60-65, ISBN 978-88-6242-000-6, (with Molinari C., Paganin G., Minati G., Proverbio E.).

b.18 "Verso la manutenzione urbana. Cultura e mercato tra innovazione e problematicità", in Fiore V. (Ed.), *La cultura della manutenzione nel progetto edilizio e urbano,* Lettera ventidue edizioni, Bagheria, 2007, pp. 242-247, ISBN 978-88-6242-000-6, (with, Molinari C., Caterina G., Paganin G., Curcio S.).

b.19 "Il progetto e la gestione della qualità nei processi di Global Service", in Fiore V. (Ed.), *La cultura della manutenzione nel progetto edilizio e urbano,* Lettera ventidue edizioni, Bagheria, 2007, pp. 398-402, ISBN 978-88-6242-000-6 (with C., Molinari C., Caterina G., Paganin G., Curcio S.).

b.20 "L'innovazione nella normativa tecnica per i patrimoni immobiliari. Dai piani di manutenzione al Global Service", in Fiore V. (Ed.), *La cultura della manutenzione nel progetto edilizio e urbano,* Lettera ventidue edizioni, Bagheria, 2007, pp.88-93, ISBN 978-88-6242-000-6 (with Molinari C., Caterina G., Paganin G., Curcio S.).

2006

b.21 "Il circuito decisionale del progetto: requisiti, proprietà dei materiali e prestazioni degli elementi costruttivi", in Molinari C., *Elementi di cultura tecnica*, Esselibri, Napoli, pp.197-214, ISBN:978-88-513-0404-1.

2005

b.22 "Conoscere per gestire: il censimento immobiliare", in Paganin G. (Ed.), *L'acquisizione delle informazioni per la manutenzione dei patrimoni immobiliari. La gestione immobiliare dal censimento alla due diligence tecnica*, Esselibri, Napoli, pp.13-39, ISBN:9788851303082.

b.23 "L'audit delle attività di manutenzione", in Paganin G. (Ed.), *L'acquisizione delle informazioni per la manutenzione dei patrimoni immobiliari*, Esselibri, Napoli, 2005, pp. 95-113, ISBN:9788851303082.

b.24 "I modelli e i processi organizzativi per le imprese di Global service", in Curcio S. (Ed.), *Global Service*, il Sole 24 Ore, Milano, pp. 155-192, ISBN:9788832457278 (with Paganin G.).

b.25 "Terminologia", in Curcio S. (Ed.) "*Global Service. Linee guida guida per l'esternalizzazione dei servizi di Facility Management per i patrimoni immobiliari e urbani*", il Sole 24ore, Milano, 2005, pp.389-396 , ISBN:9788832457278, (with S. Curcio).

2003

b.26 "Piano di manutenzione", in Curcio S. (Ed.), *Lessico del Facility Management*, il Sole 24 ore, Milano, , pp. 215-230, ISBN: 88-324-5206-5.

b.27 "Manuale di manutenzione", in Curcio S. (Ed.), *Lessico del Facility Management*, il Sole 24 ore, Milano, pp. 183-193, ISBN: 88-324-5206-5.

b.28 "Censimento immobiliare", in Curcio S. (Ed.), *Lessico del Facility Management*, il Sole 24 ore, Milano, pp.83-91, ISBN: 88-324-5206-5.

b.29 "Repertorio bibliografico", in Curcio S. (Ed.), *Lessico del Facility Management*, il Sole 24 ore, Milano, pp.321-352, ISBN: 88-324-5206-5.

b.30 "Glossario terminologico", in Curcio S. (Ed.), *Lessico del Facility Management*, il Sole 24 ore, Milano, pp.3-29, ISBN: 88-324-5206-5 (with Curcio S.).

2002

b.31 "Dal disegno alla decisione: lo scenario evolutivo degli strumenti informatici per il progetto", in Bertoldini M. (Ed.), *Saperi e saperi. Teoria e pratica nel progetto di architettura*, Clup, Milano, 2002, pp. 209-229, ISBN:9788870905670.

1999

b.32 "Itinerari tematici e bibliografici per la manutenzione", in Curcio S. (Ed.), *Manutenzione dei patrimoni immobiliari*, Maggioli, Rimini, pp. 243-272, ISBN 88.387.1526.2.

1996

b.33 "Cultura del progetto e nuova strumentalità", in Talamo C. (Ed.), *Strategie per l'innovazione*, Quaderno n.1 del dottorato in Innovazione Tecnica e progetto nell'architettura, Maggioli, Rimini, 1996, pp.17-32.

b.34 "Il circuito decisionale del progetto: requisiti, proprietà dei materiali e prestazioni degli elementi costruttivi", in Molinari C. , *Elementi di cultura tecnica*, Maggioli, Rimini, 1996, pp.197-214, ISBN 88.387.0628.X.

1994

b.35 "Le applicazione informatiche per la progettazione", in AA.VV., Manuale di progettazione edilizia, vol. III, Hoepli, Milano, 1994, pp. 83-102.

1993

b.36 "I circuiti dell'inventiva", in Bertoldini M., Nardi G., Talamo C. (Ed.), *Poiesis, L'informatica nel progetto euristico*, CittàStudi, Milano, pp.45-88, ISBN 88-251-7066-1.

b.37 "Note di attualità", in Bertoldini M., Nardi G. e Talamo C. (Ed.), *Poiesis, L'informatica nel progetto euristico*, CittàStudi, Milano, pp.273-290, ISBN 88-251-7066-1.

b.38 "Le nuove strade dell'inventiva progettuale", in Zapelli M. (Ed.), Seminari di cultura tecnologica della progettazione, Cittàstudi, Milano, 1993, pp.39-66.

1991

b.39 "Poiesis. Progetto euristico e informatica: una ricerca a carattere interdisciplinare sui rapporti tra creatività progettuale e informatica", in AA.VV., *L'informatica per il progetto*, CittàStudi, Milano, 1991, pp.39-74, ISBN: 8825170319.

b.40 "Studi e sperimentazioni per un laboratorio virtuale degli elementi costruttivi", in AAVV, *L'informatica*

per il progetto, CittàStudi, Milano, 1991, pp.75-94, ISBN: 8825170319 (with A. Campioli, G. Gotti, L. Pedrotti).

b.41 "Atti mentali e percorsi informatici", in Bertoldini M. (Ed.), *L'atto progettuale. Struttura e percorsi*, CittàStudi, Milano, 1991, pp.153-182, ISBN: 8825170211.

13.3 BOOKS EDITOR (c)

2010

c.1 *Procedimenti e metodi della manutenzione edilizia*, Vol.II, Esselibri, Napoli. ISBN 978-88-513-0681-6.

2008

c.2 *La manutenzione degli edifici*, Esselibri-Simone, Napoli, ISBN 978-88-513-0531-4, Italian edition of Albano J.R., *La maintenance des bâtiments: en 250 fiches pratiques*, Le Moniteur, Paris, 2005.

2001

c.3 *Guida alla manutenzione degli edifici. 308 schede su frequenze e modalità di intervento*, Maggioli, Rimini, ISBN 9788838719271, italian edition of Perret J., *Guide de la maintenance des bâtiments*, Le Moniteur, Paris, 1995.

1997

c.4 *I fondamenti del costruire*, McGraw-Hill, ISBN 8838607400, Italian edition of Allen E., *Fundamentals of building construction*, J.Wiley &S.,Usa, 1990 (with G. Paganin).

1996

c.5 *Strategie per l'innovazione*, Quaderno n.1 del dottorato in Innovazione Tecnica e progetto nell'architettura, Maggioli, Rimini.

1993

c.6 *Poiesis, L'informatica nel progetto euristico*, CittàStudi, Milano, ISBN 88-251-7066-1 (with Bertoldini M., Nardi G.).

13.4 CONFERENCE PROCEEDINGS (d)

2016

d.1 "Maintenance planning and breakdown structure techniques. Proposal of a "Building breakdown structure" methodology", in International Conference Proceedings of *Euromaintenance 2016*, May 30th - June 1st 2016, Athens, (with Paganin G., Atta N.) (in English). (in press)

d.2 **"**Information management for building maintenance and facility management: from building registry to BIM environment**"** ", in International Conference Proceedings of *Euromaintenance 2016*, May 30th - June 1st 2016, Athens, (with Bonanomi M.) (in English). (in press)

2015

d.3 "The strategic role of the functional analysis in the inclusive and participatory design of the built environment", in International Conference Proceedings 3rd Edition of *Inhabiting the Future*, CLEAN, Napoli, pp. 1223-1234, ISBN:978-88-8497-544-7. (with Paganin G., Atta N.) (in English).

d.4 "Management of production processes for the improvement of the environmental situation at the local level. The case of place affected by the presence of marble quarries", in International Conference Proceedings 3rd Edition of *Inhabiting the Future*, CLEAN, Napoli, pp.1135-1145, ISBN:978-88-8497-544-7 (with Lavagna M., Migliore M.).

2014

d.5 "The reuse of waste for the improvement of environmental profile of buildings products", in the *Proceedings of the 40th IAHS world congress on housing, Sustainable Housing Construction*, Funchal, Portogallo, December 2014, pp. 1-9, ISBN 9789899894907, (with Campioli A., Migliore M., Lavagna M., Oberti I., Paganin G.). (in English).

2013

d.6 "Strategies for environmental improvement of marble quarry activities. A model to evaluate impacts and to support decisions", *in Changing Needs, Adaptive Buildings, Smart Cities, Proceedings of the 39th congress of IAHS "The International Association for Housing Science"*, September 2013, Milano, ISBN 9788864930138, pp. 697-705, (with Lavagna M. e Migliore M.) (in English).

d.7 "Design for Maintenability. Tools and procedures", *in Changing Needs, Adaptive Buildings, Smart Cities, Adaptive Buildings, Smart Cities, Proceedings of the 39th congress of IAHS "The International Association for Housing Science" Changing Needs, Adaptive Buildings, Smart Cities,* September 2013, Milano, pp. 463-472, ISBN 9788864930138 (in English).

d.8 "Quality and housing: a proposal for the construction supply chain", *in Changing Needs, Adaptive Buildings, Smart Cities, Proceedings of the 39th congress of IAHS "The International Association for Housing Science"*, September 2013, Milano, ISBN 9788864930138, pp. 715-722 (with G.Paganin) (in English).

d.9 "The control of uncertainty over objectives in architectural design" in *Proceedings of the SCo2013 Congress*, Milano, settembre 2013 pp. 1-6 (with C.Martani, G.Paganin) (in English).

d.10 "Condizioni per la manutenzione: la manutenibilità e la progettazione" in *Proceedings of the CEI congress, La manutenzione programmata per l'edilizia di culto*, March 2009, Napoli pp.73-102, ISBN 9788890146855.

d.11 "Analisi sul patrimonio edilizio per il culto: metodi e linee guida per la ricerca in *Proceedings of the CEI congress, La manutenzione programmata per l'edilizia di culto,*, March 2009, Napoli, pp. 165-196, ISBN 9788890146855 (with G.Paganin).

2012

d.12 "Changing Habit': A Low Impact System for Temporary Constructions", in *Proceedings of Visions for the Future of Housing: Mega Cities*, Istanbul, Turchia, pp. 558-564, ISBN9789755614182 (with Paganin G., Agostinelli G.) (in English).

2011

d.13 "Energy retrofit strategies: the case of the Milan Trade Fair", in *Proceedings of the 66° Congresso Nazionale ATI Università della Calabria 5-9 settembre 2011 (CS)*, pp. 1-8, ISBN 9788895267111 (with Angelotti A., Ducoli C., Luccietto S., Paganin G.) (in English).

2010

d.14 "Real estate inventory, information management, strategies for energy rehabilitation: proposal of a tool supporting knowledge and decisions in Public Real Estate management" *in Design, Technology, Refurbishment and Management of Buildings, Proceedings of the 37TH IAHS WORLD CONGRESS ON HOUSING SCIENCE,* Santander (Spain) pp. 1-8, ISBN 9788469366578 (with G.Paganin, V.Cipriano, S.Parente) (in English).

d.15 "The role of durability and planned maintenance in the environmental assessment of buildings", *in Design, Technology, Refurbishment and Management of Buildings, Proceedings of the 37TH IAHS WORLD CONGRESS ON HOUSING SCIENCE,* Santander (Spain), pp. 1-8, ISBN 9788469366578 (with M.Lavagna) (in English).

d.16 "Performance measurement and improvement of non residential buildings: carbon dioxide accounting and energy saving" in the *Proceedings of the Conference Sustainable building affordable to all. Low cost sustainable solutions* , 17th-19th March, Vilamoura (Portugal), pp. 597-604, ISBN 9789899654310 (with Paganin G., Ducoli C.) (in English).

2009

d.17 "Maintenance and criticality. Criteria, methods and tools to manage maintenance process", in *Maintenance Management 2009. Proceedings of the Fourth International Conference on Maintenance and Facility Management*, Roma, Italy, pp.123-128, ISBN 9788895405032 (with G.Paganin, C.Molinari, E.Proverbio) (in English).

2008

d.18 "Green, energy, water. A proposal for the rehabilitation of a lake-side promenade" in *Proceedings of*

Environscape, B + V: 2. blu+verde international congress, October 23rd - 24th 2008, Milano, pp.243-248, ISBN:9788838743207 (with Ferrari M., Paganin G. , Paloschi S., Moressa P.) (in English).

2007

d.19 "The management of services for buildings: an interdisciplinary research approach and experimentations", *in Maintenance management 2007, Proceedings of the 3rd International Conference on Maintenance and Facility Management, September, 27th - 28th, Rome*, pp.65-69, ISBN: 9788895405025, (with Paganin G., Cigolini R., Villa A.) (in English).

d.20 "Environmental quality and building maintenance: an approach based on criticality", *Maintenance management 2007, Proceedings of the 3rd International Conference on Maintenance and Facility Management, , September, 27th - 28th, Rome,* pp.211-216, ISBN: 9788895405025 (with Paganin G., Molinari C., Proverbio E) (in English).

d.21 "Italian and european demand and offer for education and training in the field of buildings and real estate facility management services. Censiform Terotec report", in *Maintenance management 2007, Proceedings of the Third international conference of Maintenance and Facility Management*, Roma, pp.217-221, ISBN: 9788895405025 (with Paganin G., Molinari C., Curcio S., Balducci M) (in English).

d.22 "La gestione dei servizi agli edifici: un approccio di ricerca interdisciplinare e sperimentazioni in corso", in *Maintenance management 2007, Proceedings of the Third international conference of Maintenance and Facility Management*, Roma, pp.143-144, ISBN: 9788895405025 (with Paganin G., Cigolini R., Villa A) (in English).

d.23 "Qualità ambientale nella manutenzione del costruito: un approccio basato sulla criticità", in *Maintenance management 2007, Proceedings of the Third international conference of Maintenance and Facility Management*, Roma, pp.183-184, ISBN: 9788895405025 (with Molinari C., Paganin G. Proverbio E.) (in English).

d.24 "Domanda e offerta di formazione in Italia e in Europa nel campo della gestione di patrimoni immobiliari e dei servizi di facility management. Il rapporto Terotec Censiform", in *Maintenance management 2007, Proceedings of the Third international conference of Maintenance and Facility Management*, Roma, pp.185-186, ISBN: 9788895405025 (with Molinari C., Paganin G.,Curcio S., Balducci M) (in English).

d.25 "Manutenzione riqualificazione: il sistema delle relazioni", in the *Proceedings of the Conference La cultura della manutenzione nel progetto edilizio e urbano*, may 24th-25th, Siracusa, pp. 38-45, ISBN: 9788862420006, (with Gasparoli P.) (in English).

2006

d.26 "Adaptation to new requirements in residential buildings. Possibilities, performances and innovations of gypsum plasterboards", in *ADAPTABLES '06, joint CIB, Tensinet, IASS, Proceedings of the International conference on Adaptability in Design Construction*, Eindhoven, 2006, pp. 57-61, ISBN: 9789072152039 (with G. Paganin, F. Boventi, A. Salomone) (in English).

d.27 "Formazione per i servizi di manutenzione e di facility management per patrimoni immobiliari e urbani. Offerta attuale, analisi delle esperienze e proposte di nuove sperimentazioni", ", in the *Proceedings of MAINTENANCE MANAGEMENT 2006, second international conference on maintenance and facility management* , Sorrento, April 2006, pp.167-168, ISBN:9788851303662 (with G. Caterina, P. De Joanna, S. Curcio, V. Fiore, C. Molinari, G. Paganin).

d.28 "La manutenzione urbana. Stato dell'arte, scenari di innovazione, problemi aperti", in the *Proceedings of MAINTENANCE MANAGEMENT 2006, second international conference on maintenance and facility management* , Sorrento, April 2006, pp.169-170, ISBN:9788851303662 (with Caterina G., De Joanna P., Curcio S., Fiore V., Molinari C.; Paganin G.).

d.29 "Qualità nei processi di global service e facility management, Criteri per la pianificazione, gestione e controllo della qualità", in the *Proceedings of MAINTENANCE MANAGEMENT 2006, second international conference on maintenance and facility management* , Sorrento, April 2006, pp. 171-172, ISBN:9788851303662 (with G. Caterina, P. De Joanna, S. Curcio, V. Fiore, C. Molinari, G. Paganin).

d.30 Urban maintenance. State of the art, scenarios of innovation, open problems", in the *Proceedings of MAINTENANCE MANAGEMENT 2006, second international conference on maintenance and facility management* , Sorrento, April 2006, pp.239-242, ISBN:9788851303655, (with Caterina G., De Joanna P., Curcio S., Fiore V., Molinari C.; Paganin G.) (in English).

d.31 "Training for maintenance services and facility management for real estate and urban contexts. Report of the actual offer, analysis of experiences and proposals for new experimentations", in the *Proceedings of MAINTENANCE MANAGEMENT 2006, second international conference on maintenance and facility management* , Sorrento, April 2006, pp.231-237, ISBN:9788851303655, (with Caterina G., De Joanna P., Curcio S., Fiore V., Molinari C., Paganin G.) (in English).

d.32 "Quality in Global Service and facility management processes. Planning, control and assessment criteria", in the *Proceedings of MAINTENANCE MANAGEMENT 2006, second international conference on maintenance and facility management* , Sorrento, April 2006, pp.225-230, ISBN:9788851303655 (with Caterina G., De Joanna P., Curcio S., Fiore V., Molinari C.; Paganin G.) (in English).

d.33 "Procedures and tools for maintenance services planning and monitoring", in the *Proceedings of CIB W70 internazional symposium, CHANGING USER DEMANDS ON BUILDINGS. Needs for usercycle planning and management*, 12-14 june, 2006, Trondheim, pp. 368-378, ISBN: 8275510317, (with G. Paganin) (in English).

d.34 "Quality, safety and environmental planning in maintenance management for buildings", in *the Proceedings of XXXIV IAHS World Congress,, Sustainable Housing Design*, 20th-23th september 2006, Napoli, pp.1-9, ISBN 9788860260302, (with C. Molinari, G. Paganin, C. Talamo, E. Proverbio) (in English).

2005

d.35 "Innovation and transfer processes in buildings management services. Organizational models, methodologies, procedures, and tools", in *COMBINING FORCES, ADVANCING FACILITIES MANAGEMENT AND CONSTRUCTION THROUGH INNOVATION, Proceedings of the* 11th joint CIB International symposium, 13-16 June, 2005, Helsinky, Finland, pp.596-607, ISBN 9525004651 (with C. Molinari e G. Paganin). (in English).

d.36 "Real estate inventory and decision support systems: a knowledge management methodology for maintenance planning in large properties", *Proceedings of* the *First International Conference on Maintenance Management for Quality Life, safety and Productivity*, Venezia April 2005, Ateneo la Sapienza, pp. 59-65, (with C. Molinari e G. Paganin) (in English).

2002

d.37 "Information systems for real estate management", in *FACILITIES MANAGEMENT AND ASSET MAINTENANCE. Applying and Extending the Global Knowledge Base, CIB Working Commission W70, Proceedings of the 2002 Global Symposium*, 18th - 20th September 2002, Glasgow, Scotland, pp.349-362, ISBN:9781903661345 (with C. Molinari e G. Paganin) (in English).

d.38 "Strumenti interpretativi e operativi per la manutenzione urbana: un contributo di ricerca- Interpretative and operative tools for urban maintenance: a research contribution", in Fiore V., De Joanna P. (Ed.), *Proceedings of the international congress Urban Maintenance as Strategy for Sustainable Development*, Liguori, Napoli, pp. 187-195, ISBN:8820735172.

1998

d.39 "Nuovi profili professionali: il Diploma Universitario", in the *Proceedings of the Conference L'architetto in Europa. La formazione Universitaria e nuovi orizzonti della professione*, Napoli, 23th - 25th October 1998, pp.16-53 (with Scoccimarro A.).

1997

d.40 "A didactic hypertextual tool for a maintenance oriented design", in the *Proceedings of the AVOCAAD* First international Conference, 10th -12th April 1997 Bruxelles, pp. 265-275, ISBN 9076101019 (with C. Molinari) (in English).

1996

d.41 "A didactic modular catalogue for maintenance managers", in *Management, Maintenance and Modernization of building Facilities, Proceedings of the CIBW70 Symposium*, Helsinki, September 2-4 1996, Finland, PP. 505-508, ISBN: 9517583583 (with C. Molinari) (in English).

1994

d.42 "The consciousness of time evolution in quality requirements: a maintainability evaluation method for thr design of residential buildings", in *the Proceedings of the IEA94 Conference*, International Ergonomic Association, Toronto, 15th-19th August 1994. (in English).

d.43 "Ipertec, Hypertext information system for dry-assembled building elements", in *the Proceedings of the Ecaade conference*, Glasgow 7th-10th september 1994 (with A. Campioli). (xxxmanca isbn) (in English).

1993

d.44 "Poiesis. Heuristic design and computer science. Interdisciplinar researches and experimentations about the relation between design and computer science", in *the Proceedings of Visualization and intelligent design in engineering and architecture Congress*, Southampton, 28th-30th April 1993, pp.457-471. (in English).

d.45 "Studies and experiments for a laboratory of virtual construction elements", in *the Proceedings of Visualization and intelligent design in engineering and architecture Congress*, Southampton, 28th-30th April 1993, pp.489-504 (with A. Campioli). (in English).

1992

d.46 "Tools for prevision in maintainability evaluation", in *the Proceedings of the Cib Conference, Innovations in management, maintenance & modernisation of buildings*, Rotterdam, 28th-30th October 1992 (with C. Molinari, G. Paganin). (in English).

13.5 JOURNAL ARTICLES (e)

2016

e.1 "L'integrazione delle infrastrutture urbane fisiche e digitali: il ruolo dei "Big Data"" "The integration of physical and digital urban infrastructures: the role of "Big data"", *TECHNE 11*, 2016 , ISSN 2239-0243 (in Italian and English). (with Atta N., Martani C., Paganin G.) (in Italian and English). IN PRESS

2015

e.2 "Intersectorial reuse of waste and scraps for the production of building products: strategies and valorization of waste", *Environmental Engineering And Management Journal*, vol. 14 (n.7), Luglio 2015, pp. *1675-1681,* ISSN:1582-9596, (with Campioli A. Lavagna M., Oberti I., Paganin G., Migliore M.) (in English).

e.3 "La normativa volontaria a supporto dei servizi di Facility Management"**,** *FACILITY MANAGEMENT ITALIA***,** vol. 28, pp.10-16, ISSN 1973-5340 (with Curcio S., Paganin G.).

e.4 "Edifici di culto: il processo integrato progettazione-gestione", *FACILITY MANAGEMENT ITALIA*, vol. 27 pp.19-27, ISSN:1973-5340 (with Russo G.).

2014

e.5 "Integrated management of information inside maintenance processes. From the building registry to BIM systems - La gestione integrata delle informazioni nei processi manutentivi. Dall'anagrafica degli edifici ai sistemi BIM", *TECHNE 8*, 2014 , pp. 228-240, ISSN 2239-0243 (in Italian and English).

e.6 "La gestione integrata delle informazioni in ambiente BIM", *MANUTENZIONE. TECNICA E MANAGEMENT*, 2014 , pp. 16-18, ISSN 1123-1084 (with Bonanomi M.).

e.7 "BIM & FM: tra problemi aperti e prospettive di sviluppo", *FACILITY MANAGEMENT ITALIA, n.23* pp. 23-30, ISSN 1973-5340 (with Bonanomi M.).

e.8 "Ecoinnovazione. La valorizzazione di scarti e rifiuti industriali pre-consumo. Le potenzialità per l'edilizia in una ricerca del Politecnico di Milano", *Modulo*, september, pp. 474-481, ISSN 0390-1025 (with Campioli A., Lavagna M., Migliore M., Oberti I., Paganin G.).

2013

e.9 "Changing habit': A low impact system for temporary constructions", *International Journal for Housing Science and Its Applications*, Volume 37, Issue 2, 2013, Pages 99-110, ISSN 01466518 *(with Agostinelli, G., Paganin, G.)*

e.10 "Tools and procedures for a "maintenance oriented" design for buildings of worship - Strumenti e procedure per una progettazione "maintenance oriented" di edifici per il culto", *TECHNE* n.6, pp. 117-124, ISSN 2239-0243 (in Italian and English).

e.11 "The control, at the design stage, of risks related to buildings management over time - Il controllo in sede di progetto dei rischi legati alla gestione degli edifici", *TECHNE 6, 2013*, pp. 109-116, ISSN 2239-0243 (with Martani C., Paganin G.). (in Italian and English).

e.12 "Capitolati per i servizi di FM: uno studio sui criteri base di redazione", *FACILITY MANAGEMENT ITALIA*, pp. 16-21, ISSN1973-5340 (with Rosa F.).

e.13 "CNAO di Pavia: l'integrazione dei servizi manutentivi e dei flussi informativi" *FACILITY MANAGEMENT ITALIA n. 19*, pp. 28-35, ISSN 1973-5340 (with Bertola A., Frigerio A.).

2012

e.14 "Enhancement and knowledge- Valorizzazione e conoscenza", in *TECHNE 3, 2012*, ISSN 2240-7391 pp.122-131. (in Italian and English).

e.15 "Il controllo nel ciclo di vita del contratto di servizi", *FACILITY MANAGEMENT ITALIA* n. 17, pp. 17-25, ISSN 1973-5340.

e.16 "Politecnico di Milano: ricerca e sperimentazione per il retrofit energetico degli edifici", *FACILITY MANAGEMENT ITALIA*, n. 18, pp. 45-51, ISSN 1973-5340 (with Ducoli C.).

e.17 "Verso un progetto della/per la manutenzione?", *FACILITY MANAGEMENT ITALIA* n. 15, pp. 25-32, ISSN 1973-5340.

e.18 "Valorizzazione dei patrimoni pubblici: la centralità della conoscenza", *FACILITY MANAGEMENT ITALIA* n. 16, pp. 14-19, ISSN 1973-5340 (with S.Curcio).

2011

e.19 "Basi di conoscenza per i servizi di FM: il ruolo dell'anagrafe immobiliare ", *FACILITY MANAGEMENT ITALIA, n.11, 2011*, pp. 19-28, ISSN 1973-5340.

e.20 "Sistemi informativi per i servizi di FM: dalla teoria alla pratica", *FACILITY MANAGEMENT ITALIA, n.13*, pp. 24-33, ISSN 1973-5340.

e.21 "Edifici scolastici: un patrimonio in stato critico", *Facility Management Italia* n. 10, pp. 21-31, ISSN 1973-5340 (with Fianchini M.).

e.22 "I Patrimoni immobiliari. Il contributo della normativa volontaria al consolidamento e alla diffusione della cultura manutentiva: il quadro nazionale", *U & C. UNIFICAZIONE E CERTIFICAZIONE*, vol.5, pp. 36-37 , ISSN 0394-9605 (with C.Molinari, G.Paganin).

2010

e.23 "La centrale di governo per la gestione strategica degli appalti di servizi integrati", *FACILITY MANAGEMENT ITALIA, n.7, 2010*, pp. 14-24 , ISSN 1973-5340 (with Cipriano V.).

e.24 "BImA: il governo e la gestione del patrimonio pubblico statale in Germania", *FACILITY MANAGEMENT ITALIA, n.8*, pp. 28-31, ISSN 1973-5340 (with Busco Ferber E.).

e.25 "Politecnico di Milano: il sistema di regia e di governo dell'appalto di Global Service", *FACILITY MANAGEMENT ITALIA*, n.9, pp. 40-56, ISSN 1973-5340 (with Vitola F.).

e.26 "I campi fotovoltaici", *Trasporti & Cultura* n.26, pp. 21-29, ISSN 1971-6524.

2009

e.27 "Quali competenze per i servizi di Energy Management", *FACILITY MANAGEMENT ITALIA, n 3*, pp. 32-41, ISSN 1973-5340, (with Paganin G.).

2008

e.28 "Piani e programmi di manutenzione: le linee guida tecniche dell'UNI", *FACILITY MANAGEMENT ITALIA, n 1*, pp. 26-36, ISSN 1973-5340 (with Molinari C.).

2007

e.29 "L'offerta di formazione per il Facility management in Italia e in Europa", *FACILITY MANGEMENT ITALIA*, n.0, pp.27-34, ISSN 1973-5340.

2005

e.30 "Conoscere per gestire. L'acquisizione della conoscenza per la gestione degli edifici", in *Manutenzione. Tecnica e Management* vol. 5, Maggio 2005, pp.40-43, ISSN:1123-1084 (with Paganin G.).

2002

e.31 "Manutenzione programmata in edilizia ed evoluzione del quadro normativo", *AL*, n. 10 , ottobre 2002, pp.34-36, ISSN:1825-8182.

1996

e.32 "Manutenzione, programmazione e controllo", *Qualità dell'abitare n.1*, gennaio-febbraio, pp.19-29.

e.33 "La qualità quantificata", *Qualità dell'abitare n.2*, marzo-aprile, pp.44-52.

e.34 "Nuovi approcci alla garanzia di qualità", *Qualità dell'abitare n.3*, maggio-giugno, pp. 33-38.

e.35 "Le professioni della qualità", *L'Ufficio Tecnico*, dicembre, pp.1491-1503.

1995

e.36 "La qualità nei sistemi dinamici", *Qualità dell'abitare n.1*, Gennaio-febbraio, pp. 53-58 (with Molinari C).

1994

e.37 "Benessere e risparmio: i due parametri di riferimento per gli interventi di isolamento degli edifici", *Superfici* n.7, ottobre, pp.19-27.

1993

e.38 "CAD= Computer Aided D...", *Il nuovo cantiere* n. 6, giugno, pp.78-83 (with Molinari C., Vignati G.).

1991

e.39 "I controsoffitti", *Recuperare n.*4, maggio, pp.314-321.

1990

e.40 "308: una legge a favore del recupero energetico", *Recuperare* n.45, gennaio-febbraio, pp.42-43.

e.41 *"*Isolamento termico negli edifici esistenti", *Recuperare* n.45, gennaio-febbraio, pp.40-55, con Giancarlo Paganin.

e.42 "Una soluzione ideale: la casa zero", *Eubios* n.6, pp.12-36.

e.43 "Rinverdire la città", *Eubios* n.7, pp.54-56.

e.44 "Abbaino energetico", *Recuperare*, n.47, maggio-giugno, pp.280-281.

e.45 "Le controsoffittature. Caratteristiche e riferimenti normativi", *Recuperare* n.49, settembre-ottobre, pp. 477-479.

e.46 "Perchè un laboratorio di informatica", *Sinopie* n.4, pp.4-20.

e.47 "Progettazione e computer: ipotesi per un rapporto interattivo", *Sinopie* n.4, pp.42-46.

e.48 *Sinopie n.4, editor of the monograph about Le attività del Laboratorio di Tecnologie Informatiche del Politecnico di Milano (The activities of the Information Technologies Laboratory).*

1988

e.49 "Impianti autonomi", *Recuperare* n.37, settembre-ottobre, pp.586-587.