ABCPhD CALL4SCHOLARSHIP 33
Research topic: Innovations in Technical facility management services in the field of hospital buildings: digitalization processes and IoT applications.
(33 - Annex 1.4)
Funding and management of the thematic scholarships

- **Number of scholarships:** 1 (one)
- **Monthly net income:** € 1.012,00 (max 36 months)
  [In case of a change of the welfare rates during the three-year period, the amount could be slightly modified]
- **Additional support:** Funding for educational activities(*) : € 1.370 per student [for the 2nd and 3rd year]
- **Starting of PhD activity:** 1/11/2017
- **Deadline for application to the call:** 11/09/2017
- **Research Director:** Cinzia Talamo
- **Research Group:** Andrea Campioli, Giancarlo Paganin, Raffaella Brumana, Giuliano Dall’O’
- **Funding and cooperating Institutions:** the scholarship is co-funded by Politecnico di Milano, Department ABC and the NBI SpA

(*) (purchase of study books and material, funding for participation in courses, summer schools, workshops, conferences)
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Context of the research activity

It is well known that the incidence of maintenance activities in the entire life cycle costs of a facility may be very high: this may radically change the profitability or cost-effectiveness of this facility. The idea of an Internet of Things infrastructure opened out new scenarios also in facility management: the development of instruments, procedures and models for more reliable facility maintenance processes. Construction components may be equipped with sensors, software systems and data boards to monitor specific parameters and to “communicate” with a central system, as widely practiced in other industrial sectors. On the other hand, there is an abundance of software that can gather, process and elaborate data. Data processing may realize an organized and well-oriented condition-based dynamic maintenance process, upgrading the traditional static planning methods, based on often poor statistics, proactively tuned with the real performances. The opportunity needs exploratory research activities, since a variety of issues must be studied to set a “dynamic” maintenance plan up and to start innovative, management services. We must define which measure represent building components and the risks to be prevented, how to collect, store and share data, how to assess the systems and how to connect these data to planning models, eventually to understand the organizational impact of this system both in terms of governance and field operations.
Motivation and objectives of the research (1)

The objective of this doctoral dissertation is to study in depth the possible scenarios of innovated planning methods and management of technical services (with a special focus on the system components) and to design possible “horizontal” scenarios of governance (relationships between staff, competences, decisions, reports) and “vertically” in the possible re-configuration of relationships between those performing the operational activities in a complete process of the supply of technical maintenance services - from the workers to the subcontractors and third-party specialists.

The PhD Candidate will deepen different scenarios which a technological facility management operator may come to face, from situations characterized by outdated systems and lack of technical support documentation, to situations characterized by the use of Building Information Technologies (BIM).

The PhD Candidate will highlight the advantages arising from the implementation of a dynamic planning (condition based) with respect to a traditional approach (static programming), its advantages in terms of costs, system efficacy and energy expenditures, besides customer satisfaction.

The case studies will be Healthcare Facilities: innovative technical management services will be tested in terms of services provided on existing buildings, as well as the service setup modes, starting from the building’s design phases and/or the setting up of technological maintenance service deliverables.
Motivation and objectives of the research (2)

The doctoral candidate will have the support of a Company leader in the sector of Facility Management and technical infrastructure in buildings, focused on environmental protection, energy efficiency and IT technologies. The PhD Candidate will study innovation in advanced management and maintenance models, in terms of benefits, implementation procedures, competences and professional skills needed, at a national as well as international level.

In fact, the aim is also to realize a comparative study with foreign situations, especially those that are more advanced and thus suitable to experimentation of such processes, particularly:

- development of process models for the design of innovative services in the perspective of digitalization strategies;
- analysis of the potentials of innovative data management models (Internet of Things);
- identification of new and high performing targets available (possibility to develop BIM models in relation to technical management activities);
- definition of the competences and training orientations to update the traditional figures of professionals and creation of new professions.
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**Methods and techniques that will be used to carry out the research**

The methodology and research activities entail:

- Analyses, through literature reviews, of current scenarios about healthcare facilities maintenance planning.
- Comparison of the different organizational models at national and international levels.
- Analyses of organizational models of the Facility Management Structures and their change in relation to contracts (project finance, construction permits and management, project and construction management).
- Definition of the evolutionary scenarios of healthcare facilities management and maintenance processes.
- Design requirements for data gathering and dynamic maintenance planning of plants.
- New organizational and procedural models tests for some of the scenarios and selected case studies.
- Comparison between maintenance management models for technical infrastructure in buildings and relationships between different supply chain operators (supply chain change management).
- Analyses of the possible “horizontal” and “vertical” organizational changes.
- Analyses of the cognitive and relational behavior between people and construction of the competence profiles necessary for the correct working of the models identified above.
- Orientations in defining sets of information for the creation of bookstores of technological objects/components and equipping them to enhance their capacity to “dialogue.”
- Construction of an educational catalog for the updating of traditional operators in the design of maintenance activities.
Research Topic: Innovations in Technical facility management services in the field of hospital buildings: digitalization processes and IoT applications

Educational objectives
This study enables the candidate to deepen themes involved in the identification of innovative approaches in the technological facility management sector which needs to find innovations, to provide clients with increasingly high performing services. The candidate will have the chance to elaborate the skills that the market increasingly demands today, and also develop and apply them in a global context. The weld between research fields and national and international applications are a significant feature and stimulus for research.

Skills of the candidate
The candidate will acquire know-how and competences in the fields of:

- Innovative technological management models
- Digitalization of a building’s entire life cycle
- Innovative models for technical management of healthcare infrastructure
- Advanced development of the maintenance processes
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Job opportunities

The definition of new cognitive and organizational models of the maintenance process is an economic and social issue to which also the Italian operators are trying to respond so as to maintain their own competitiveness in the global market. The study intends to enhance on-the-job development and consolidation of change mechanisms in organizational systems, through a conscious use of the results already achieved worldwide with respect to the specificity of the Italian production chain. The opportunity to have, as a support to the study, a leading player in this market both in Italy and abroad, gives the doctoral candidate the chance to immediately come into contact not only with the reality of entrepreneurial management and specialists in the field of the digital information processing, but also with the great public and private proprietors.