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edited by

Filippo Bosi, Paolina Ferrulli and Elisabetta Fossi

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Part I - Critical Contributions

Methods or tools?

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Dealing with methodology, and then dealing with methods, leads to looking for answers in the philosophy of science essays. The scientific method, long debated to assume different characteristics, has been and still is, the subject of discussions that sought to understand, on the one hand, which approach is more representative of the way in which the researcher works, and on the other hand, which approach constitutes a guide for those who are preparing to do research, as in the case of our PhD students. However, the question remains, is the scientific method - whatever it is - relevant to architecture? Architecture is not a science, therefore it is questionable whether or not the research in architecture can be considered scientific. Scientific research is the one that can model the phenomena and thus predict the repeatability of certain conditions. I work in the Science for Architecture department: architecture is not a science but uses "science". Architectural design is not scientific because it includes interpretative choices entirely subjective, however, the construction of architecture makes use of science (through means of technique and technology).

Feyerabend, in "Against Method" warns that, "Science is essentially anarchic enterprise: theoretical anarchism is more humane and more open to encourage progress not its alternatives based on law and order." One must conclude that even if, as architects, we use "science," the study of the method is useless.

The Technology of Architecture is a "discipline" that some colleagues note has "weak statute" due to its ability to be linked to many disciplines, maybe without being a real discipline itself. In fact, in certain academic fields this discipline is not separated from the design activities in teaching. However, architectural technology studies concisely support the use of the technique in projects, thus architecture has a lot to do with the science.

In the activities of the young student researchers, research

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methodology, and the methods used, should be read between the lines and often extrapolated from the joint activities, as it does not always appear to be clearly defined and described. For this reason, I seek to explain, in the papers that follow, the methodology and methods used in their research. In some way, the succession of working phases identifies a methodology and methods, even if it is not always related to explicit categories. The variety of topics, contexts, and goals that research in technology tackles currently leads us to think that Feyerabend is right and that his thoughts come to our aid: "The only principle that does not inhibit progress is: anything goes well." But I am not quite sure I agree.

Avoiding the discourse on the different meanings of "methodology" – I do not think I have the appropriate skills for such an epistemological dissertation – I am interested in talking instead of "methods" and "tools", since, as will be clear from the analysis of the papers included in this text, the logic of applied research often leads to one identifying the other.

Research in technology makes extensive use of tools. The use of a tool, that is, the whole of the instrument itself and the manner of its use, can be a method of investigation; the succession of phases of investigation, each characterised by a method, may in fact constitute methodology if appropriately contextualised. In this sense, it is useless to restrict research activities in default methods, insisting on the adaptation of work to encode approaches that could effect and limit the activity itself. I believe we must continue working to ensure that students and researchers are independently aware of methodological choices.

It seems useful to comment on the research presented – without expecting to be exhaustive – according to groups characterised by some thematic or methodological affinity, in order to reflect on the state of research training.

There are many research activities that target the development of a tool to aid in the design process (in the broadest sense of the term examples include: planning, management, meta-design, etc.). The methodology that is suggested is characteristic of this kind of "applied" research: as a result of the expression of need, we analyse the state of the art, a model of the object of investigation is carried out to understand the characteristics common to most cases. We then take a

predetermined tool, assume a modification of the instrument to fit the considered issue, then apply it to a case study in order to understand if the instrument is adequate to fulfil its mission and, possibly, we proceed to its revision. It is a process that moves clearly on the structure of the inductive method, which begins with the observation, and one tries to model a phenomenon and then apply it and test it.

Chiara Marchionni, identifying an appropriate procedure for redevelopment of the smaller towns in Abruzzo - which takes account of the historical value of witnesses but also integrates objectives of revitalisation that cannot neglect the need to redefine the energy performance - claims to apply a methodological approach of the "case by case" and identifies three main stages: knowledge, meta-planning, and identification of design-scenarios.

Chiara Casazza investigates a theme quite common in different disciplines, especially in the fields of urbanism and landscape: urban agriculture. Technology of Architecture has for some time shared with these subject areas some objects of investigation. Specifically, the vocation of land use is considered to be not only determined by political processes of negotiation but also by inter-disciplinarily identified environmental values through a needs-performance approach that has always characterised the research activities of our disciplinary field. In this research, the stages of analysis, and the tools and methods used appear to be indistinguishable from each other. And it is a real tool to assist in the design process that Casazza wants to have as a result.

Then we find a group of theses focused on the study of specific structures with special destinations: airports, care facilities and places of detention. All are intended to identify ways of managing the project through the development of tools for assessing the sustainability of the intervention (environmental, economic), management of the design process in order to allow for the comparison of options, control of typology and spatial arrangement in order to allow different fruition models. The development of functional and relational diagrams for determining metaprojectual options are part of the history of the subject area of Technology of Architecture. Consolidated research topics include optimising plan distribution for public housing, the definition of rules for evolutionary building and self-building (issues typically associated with each other), and the spatial organisation of

the buildings for special purposes.

Elisabetta Fossi deals with Life Cycle Cost (LCC) of airport terminals. Also in this case, the primary goal of this research is to realise a tool for the management of the process of identification of the best option in the design of an airport terminal through an assessment LCC.

Paolina Ferruli has as her objective the establishment of a system of tools to control projects in order to reduce its impact on the environment called the Green Airport Evaluation Design. The evaluation is done with regards to the entire life cycle. The control of the design process and the management of the airport, in reducing environmental impacts, should also reduce the constraints on a potential growth of service structures.

Filippo Bosi, with a search on Airport Lean Design, describes his research process through phases: the analysis of the state of the art, the analysis of instrumentation for design control already tested, and his transfer to the specific case, that of the planning of airports. The goal is to reduce waste, in terms of work hours due to the need to redesign or transform projects or buildings whose creative process is not properly managed.

Similarly to the previous cases, Ginevra Bruscoli aims to achieve a LEED certification protocol for healthcare buildings to adapt to the evaluation of health care facilities in Italy. The assessment tool is useful - as well as allowing for a building to provide a report card that defines the impact on the environment - as a management system of design alternatives, in order to reduce the resource consumption of buildings, during both construction and management. The initial assumption is, therefore, that this kind of tools is suitable for the purpose.

The thesis by Luigi Vessella seems to lie in the strong tradition of research that uses the meta-project as a tool (or as a method?), focusing on typological alternatives for the construction of prisons with limited need for security management. Prisoners considered harmless may well serve the term of imprisonment in buildings very similar to collective housing through spatial organisation with variable levels of accessibility.

In this type of approach one moves within a predetermined methodological context; it is assumed that a particular investigation

process is able to lead to a correct solution, thus an instrumentation application already experienced by another is optimised. This allows one to get to the results that can be used in a given project or meta-project context, but does not always allow the identification of alternative routes that would benefit from as Popper notes, confutation techniques.

The research activities that aim to redefine, or at least to critically analyse, fundamental assumptions of the environmental and technological design that have become, in some cases, real paradigms, or at least the cultural references that can drive our investigation choices, seem to be just in our academic discipline, or at least in the sample thesis being discussed in this paper.

The thesis by Maria Canepa seems to be the subject of research that, although departing from the observation of reality, mostly preserves the characteristics of basic research, namely conceptual speculation. Focused on the need for a re-analysis, more than 25 years after the formulation of the concept of Sustainable Development in the Brundtland Report, Canepa clearly expresses a willingness to adopt conceptual survey methods, obviously adapting them to the topic under discussion. To compare questions and answers, as they were and how they could be, she proceeds first by induction to identify the "phenomena" that represent the application of this principle in architecture, then, once climbing back from effects to causes, traces the flow of data from its origins to today with a deductive process. The stages of knowledge and analysis are therefore guided by a "round trip" process according to the methods mentioned, with the final identification of application themes (e.g., energy standards, environmental assessment certifications) to be submitted to a process of confutation for understanding its consistency with the original objectives. A problem in this kind of research - but I do not think it is a flaw, it is, rather, their peculiarity - is the difficulty to define the final "product" of research in a form of dissemination so that it can easily reach recipients that could make use of it (in this case that might be other researchers).

Another research thesis that deviates from the main group is the one Silvia Gobbi, which deals with the identification of the foreign markets in which the Italian building industry can find an exit to the crisis situation in Italy. In fact this crisis is not only due to the economic crisis but also to building market saturation due to the saturation of the offer. The objective is to identify strategies for Italian companies

so they are able to enter the global market, with particular reference to the emerging countries. The research involves the application of the SWOT Analysis (Strengths, Weaknesses, Opportunities, and Threats) and AAA Analysis (Adaptation, Aggregation, and Arbitrage). These analysis tools are typical of corporate marketing.

The thesis by Janaina Luisa da Silva Moroni focuses on the comparison of methodologies for the management of creativity for the project, with particular reference to the visual and product designs (the present edition of Osdotta was open to the sectors in the same macro-sector to which Technology Architecture belongs). The PhD student compares various methods, as described by the authors, comparing the number of stages, the order and position in the process. This should result in an overall view useful in teaching design.

Finally, there is the thesis by Silvia Covarino, which deals with one of the most often addressed topics and that is again gaining interest: policies and strategies to solve the housing problem, today again to be considered an emergency. The paper presents the synthesis of a very broad survey of different forms of housing problems, both in the countries in which the right to housing is sanctioned and those where it is not, with a bold comparison between cases placed in different contexts in order to identify strategies employed where the problem has been addressed and perhaps resolved.

In analysing the methodological approaches of the examined theses, one must not forget that the authors are researchers in training. The emphasis given to the analysis of the state of the art, both in cases of relatively similar research and of tools to accomplish the research, does not seem to have a counterpart in the identification of the method of analysis that often coincides with the same set of instruments used rather than in a specific process of conceptual elaboration. This is quite understandable since these are not the final documents, intended to illustrate the results of the research, but documents that show progress in the investigation process and the effort to acquire the necessary knowledge. The prevalence of theses of applied research results can be seen in the use of predetermined tools of established methods,

which allow some confidence in the achievement of results, even within international networks.

Notes

1. Translation by the author.
2. Perriccioli, workshop "Incontri dell'Annunziata" 2014.
3. Translation by the author.

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Doctoral research in architectural technology between methodology and competiveness. Strategies for internationalization, operability and qualifying skills.

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Doctoral research is generally defined as "starting act" of a young scholar in a scientific community. It has to adopt coherent ways both to communicate with the disciplines that are object of study and to use the adequate and coded methodologies of scientific research. The aim of doctoral research is the creation of refutable hypothesis of research to reach innovative goals implying originality.

The analysis of both the suitability of research methodologies and the typicality of the subjects treated, however, cannot - at least in this circumstance of reflection - divert attention from other observations about the actual background of the doctoral research in our country.

The strengthening of the national scientific internalization process requires a common effort to understand the real meaning of these future dynamics. This action involves not only the single disciplinary fields, but also a substantial part of the scientific community.

It is a fact that the challenge implied by this need determine the overpass of the validation logics of the scientific progress in disciplinary/local/national fields and a clear identification of the skills acquired by the PhD doctor. This challenge is for an immediate location on the World Wide Web of knowledge; surely not something new for our disciplinary net OSDOTTA.

This dynamic of internationalization looks complex especially because requires the of reorganization of some scientific communities, but in the meanwhile - of course there are exceptions - it doesn't seem to be raising particular concerns about qualitative or quantitative deficiencies of the outcomes of the researches that were done prior to now .

The application of meticulous methodologies in the different disciplines constitutes a stable equilibrium (both for the practices now

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and in the future) in sharing and verifying the research results.

It's all about the adoption of what the American thinker Kevin Kelly defines as *"(…) the modern practice of science (…)"*[1] (Kelly, 2010) as an object of a continuous transformation. A doctrine that assimilated Francis Bacon's experimental innovations (XVII century), the logic of science and randomization that is at the basis of Charles Sanders Pierce's statistic inference (1877) and Karl Popper's principle of falsicabity (1934).

A modern practice recently able to recognize the value of informatics simulations – for the generation of the research hypothesis to refute or the models of development – and the experimental Double-Blind tests (1950) until the seventies and the more complex meta-analysis that were medically and epidemiologically significant.

Comprehension of this methodologic evolution by the PhD candidate and the metabolization of organizational automatisms (in phases) of scientific works have always been subject to assessment by the supervisors assigned and/or by the Academic Boards.

Many fields of architecture –and between them also our younger Architectural Technology – recently started competing with the "open" diffusion of results that are the outcome of the evaluation by peers, blind or double blind review of their own products; methods already used and confirmed by many other scientific fields.

These ancient methods - first appearing in 1752 - were invented or adopted almost right away in some scientific fields, but, evidently, not in all and not extensively.

This positive trend was surely influenced by the awareness of being a bridge discipline between conceptual designer and constructing architects, between engineers and quantity surveyors, or generically speaking, between rigorous scientific fields (applied mechanics and physics) and more evocative classical arts (figurative and statuesque), or between technique and philosophy.

Where these criteria were not applied, other similar methodologies guaranteed scientific quality of the results claimed by the authors (submission of the products to qualified scientific committees, panels of international experts, external evaluation groups, editing committees, Academic Boards, etc.).

The need for universally shared instruments, the homogenization of judicial results, and the prevention of scientific communities from being self-referential, is quickly going toward the universal adoption

of these types of models.

However this goal implicitly demand a strategy change also in the diffusion or in the contamination of our own knowledge that shouldn't affect who, as the PhD candidate, is active part of this scenario.

The finality of this choice has to be universally clear and has to be almost banal. We're face to face with the occasion to export our knowledge, we're not doing a punctual upgrade to new scenarios without an actual reason. We have to prevent the risk both of impoverishment of our scientific tradition and of the importation of developing untested models and born in different social and cultural environments.

We are going to be determinate in keeping our attention into territorial needs, to sector demand (production of construction companies), to process and to national markets.

The research on topics that are external to our scientific aggregations - hopefully - is going to bring us to endogenous enrichments and a weighted methodological transfer.

Experimentation with more technologically advanced tools and methods could bring, also to our country, a series of future developments and - for example - in particular evidence today the ITC or, generally, of immaterial technologies bonded with the availability of high performance infrastructural nets (Broadband in many cases now almost inexistent) or in the field of Building Information Modeling.

If this will be a shared objective, we are going to be able to be the protagonists in our own direction and not background actors in this extended scene as it has already happened in other fields of study.

Since its birth, the peculiarity of architectural technology is that it has its basis on its major four pillars that develop only through circular and interdisciplinary interaction: research, didactics, profession and the production world.

These realities, together with the already quoted relations between the areas involved, bring together similar disciplines such as Architectural Technology and Industrial Design. It's not a case that those two are composed similarly.

Historically speaking, the choice of searching for a new way to operate the field of technology and of the building industry has brought to the constitution of those two different competences.

Even if evident, there were not just necessary requirements to reorganize the active roles in the Scientific and practice paths (starting from the end of XIX century, then in the second half of the XX C.)

to cause the birth of our scientific discipline.

The new and more innovative vision of the relationship blueprint-building led to a new strategic approach. A new type of scientific research had been motivated by more practical backgrounds (postwar, social, political and professional), new technologies created with innovative materials and new more complex organizational setups in the industrial production.

Today we are asked to renew such strategic approach.

There are different variables in this problem, but the method of resolution could strategically be similar to the previous one.

The practical scenarios have changed and today they reveal economic depression, diminished energetic resources, sustainable growth and –in particular in Europe- migration fluxes.

New technologies are very well structured. They are advanced in the automation and in the fields of robotics, but also in the new organic building materials. We are not any more interested in focusing exclusively on the research of the evolution of tangible building technologies, but we are also interested in "immaterial" experiences derivate by the digital world (ICT, Big and Open Data, GIS., Augmented Reality, etc.).

The organizational models of the industrial production today are even more complex than before. They overstepped their role in the industry invading the architectural world putting an end to the artisanal part of being architect.

In this big scenario of organizational requests there is an interaction between new needs and quality that are essential for an architect such as energetic efficiency, environmental sustainability and the control of the life cycle of the building.

Nowadays the quality and environmental control of the design process overtake "static" analitic levels to become "dynamic" tools. Preventive Simulation Tools able to activate Real Time evaluations during the technical design phase.

The evolution of the Building Modelling Systems (BMS) and of similar control systems and the simulation in real time of the energetic behavior of alternative technical solutions, are going to be briefly an unique piece with the project cost tools.

However the entire combination of these new scenarios don't refute the directing role of those who want to make innovations through a modern way to research.

According to the English thinker Stephen Emmit[2] the success of every individual research is located inside:

" It is the relationship between context, methods, professional relationships and reality (…)"

Emmit concludes describing roughly his thought of research with these words "(…) the context is also affected by the people involved in the research (…) this includes the founders, the individuals who conduct the research, and in many cases those subject to the research inquiry, and the target audience. Thus personal values, ethics, interests, experiences and desires will shape the research. (Fig.1)

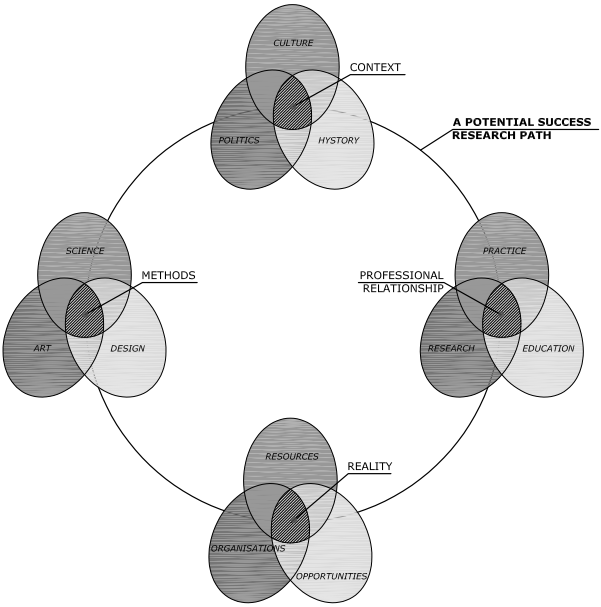

Fig. 1 - A Potential Success Research Path
(Freely adapted table and elaborated by the author taken from the Fig. 6.1 titled: Research, practice and education by Emmit S., "Architectural Technology", 2002, Blackwell Science, Oxford, UK, pag. 232).

It seems to give value to the previous observations about the need to mantain the cultural tradition in all those actions of research that are applied to bigger circumstances because dense of personal and ethical values.

Despite this really synthetic contribution compared with the real topics' complexity, the mentioned observations and wishes have been encouraged by reading PhD candidates' products presented and

described into OSDOT 2.0, Tenth PhD Seminar Macroarea 08-C1, held in Firenze in November 2014.

The seminar has been composed by eleven papers representative of similar and homogeneous scientific methodologies, but with peculiar identifying factors.

Even though the relative shortness of supplied documents, each suggestion is characterized by novelty, organizational maturity and right thinking.

Research areas of interest are coherently related to existing investigation demands identifying precisely final beneficiaries/users and stakeholders involved.

In order to get a sense of starting framework, the analysis of products' keywords is interesting. Sustainable development, Compatibility, Poverty living, Urban Regeneration and Agricolture, sustainable Healthcare facilities, PDM and automated evaluation tools, Prison Metadesign and Architecture, Airport and Lean Design, Emerging Countries and internationalization process, Airport life cycle costing are current and remarkable topics, able to guarantee an expanding strategic research towards a well done PhD final thesis.

Within the most theoretical and incisive papers, with meaningful methodic approach, the products of M. Canepa and of J. L. Da Silva Moroni are differently remarkable. The first one examines sustainable development 30 years after the old Bruntland report, thanks to a precise methodological control action based on multi-scalar and cultural investigations with the aim to propose new and mature key instruments. The second one looks for new approaches and creative models, challenging various areas towards a typical economical development.

Research practicality and utility are pronounced in some other works. F. Bosi F., E. Fossi and P. Ferrulli proposals are three well oriented and organized suggestions.

Life Cycle Costing studying in airport terminal project and the aim to identify new tools for airport designers and managers are consistent with innovative sustainable strategic practices and with airport Lean Processes design. In this last case, the new processes based on the integration between airport's design management, its realization and quality, represent a contribute in BIM. process, actual and constantly developing design modeling instrument.

Beyond these proposals, also other researchers and their papers have a flair for the acquisition of exclusive competences based on strict methodological control.

Design difficulties related on current hard situations and urban sustainable requalification strategies have been faced in an original way by C. Marchionni and C. Casazza's works.

Even if these topics look different in starting aims, they are well-established in today scenario and propose similar modes of operation, especially based on multi-scalar strategies. Post-seismic technological and energetic recovery and urban requalification through Urban Agricolture are topics not totally investigated, especially considering strategic aspects so worthy, above all for their Smart possible applications for sustainable local and urban policies.

Moreover S. Gobbi and S. Covarino's projects have revealed laudable methodological approaches and logical aims in accordance with the mentioned research products' internationalization in our PhD schools. In the first work the SWOT Analyses is a practical and remarkable choice as regarding tool for planning/technical and management Know How to export towards developing countries.

In S. Covarino's case, the analytic and multidisciplinary approach applied in various metropolitan areas generates new housing solutions and flexible technologies for their realization. Extended urban areas joining common characteristics like multiculturality, a development need and a diffuse social balance (social housing necessary endowment) and ample poverty pockets, make this topic an example in ethic research.

In the end the last reflections, to understand all appeared values, are from the researches by L. Vessella and G. Bruscoli. Both research products are well organized and pristine, comparing with specialized spheres like respectively inmates housing and healthcare facilities.

The novelty is declined in different way, but in both cases it follows persuasive and incisive methodologies. In Vessella's paper, innovation is intended personally using a spatial and organizational proposal aimed to overtake traditional prison design models well supported by a careful analyze of the state of the art and prescriptive for the topic.

The development and the information transfer of LEED system in national context with the contemporary adjustment for Healthcare, are the remarkable peculiarities of the well organized and useful proposal composed by G. Bruscoli.

Furthermore in this specific case it is clear as the model, or the instrument, import and its patient incorporation in typical national context can represent a successful factor for the research and in general repeatable experience in other applicable backgrounds.

Notes

1. Please refer to *Research, practice and education* pag. 232 in Emmitt S., "Architectural Technology", Blackwell Science, Oxford, UK, 2002.
2. Stephen Emmitt is Professor of Architectural Technology at the Loughborough University, UK.

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Part II - Scholarly Research

Sustainability in architecture thirty years after the Brundtland Report: a critical approach

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Abstract

The research aims to reconsider the concept of sustainable development and consequently of sustainability, because it maybe justified to say that their meaning have been manipulated. Therefore almost thirty years after its formulation, it is a concept which needs to be reviewed. Sustainability issues enjoy great popularity, however a certain lack of critical approach to this topic has been detected. The goal of this research, albeit ambitious, is to shed light on the relationship between the effects of sustainable development and architecture, considering as objects of the analysis the implications and the consequences of the concept of sustainable development: the products of sustainability. They could have a great influence on the man-made environment currently designers, regardless of the position which can be assumed with sustainability, must deal with this process such as in the case of regulations.

Although sustainable design is often focused on technical aspects or performance, this research aims to integrate them with a cultural analysis, outlining a cultural history of sustainability, to avoid omitting a number of aspects which if left unchecked in dealing with such a complex subject, could cause shortcomings and over-simplifications.

The complexity of the scenario allows a choice of methodological approaches to the research. Thus the research proceeds first by induction, identifying the subjects and the critical issues related to them, starting from the basic formulation of the subject itself and the direct consequences of it, through to the analysis of the most influential authors and the historical context in which they arise. Then examining the specific elements for a more in-depth analysis.Thanks to the results of this analysis, the research proceeds by deduction to the origin, that is the basic formulation of the subject (sustainable development) and its consistency with the objectives set, assessing the results of research in the conclusions.

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Keywords
Sustainable Development, Sustainability, Ecology, Design, Environment.

Research scenario

Starting from the definition of sustainable development, it appears as a process aimed to achieve goals of environmental, economic and social improvement, locally and globally.

For these reasons, a sustainable development as defined, is incompatible firstly with the degradation of the environment and natural resources and also with the violation of human dignity and freedom, poverty and economic decline, the lack of recognition of human rights and equal opportunities.

The definition of sustainable development formulated by the Brundtland Report attaches to the concept of sustainability a strong sense of ethics, stressing the need to operate in the present a series of choices which could ensure that future generations will enjoy the same benefits as their predecessors, pursuing a common good future, put at risk by man's attitudes and behaviour towards the environment and its resources.

Therefore the advent of sustainable development has been positively welcomed by many authors as one of the greatest challenges of the next millennium, in the social, economic and environmental fields (Tiezzi, Marchettini 1999).

Therefore, the objective of sustainable development is to control and limit human activity to reduce the carbon footprint, trying to deal with a number of issues related to pollution, exploitation of non-renewable resources and soil consumption.

Despite these problems being currently shared by the majority of the scientific community, a lot of conflicting opinions have been expressed about some of these issues putting them in discussion, sometimes even by authoritative voices, as happened in the case of the Nobel Prize-winning Kary Mullis (2013), which believes that a direct connection between climate change and carbon dioxide emissions is not scientifically demonstrable. However, having certainty about the causes of climate change is important, because it is on this, as well as on the exhaustibility of fossil fuels issue, that guidelines on energy efficiency are based in different sectors of the economy.

It may be justifiable to say that there are some aspects related

to energy and environmental issues that may be considered incontrovertible: saving meant as a limitation of energy, resources or soil consumption, even if presupposes some kind of waiving, is a concept that generally carries a positive meaning, since the restriction implemented in the present ensures the possibility of future wellness. However, it should be stated unambiguously what is meant by welfare and what dynamics will start in response to the limitations made. When you are confronted with the sustainability issue, first of all, is important to identify the different approaches that you may have about this topic.

The environmental aspect of sustainability is the one most strongly promoted through the media, who often use examples to influence people emotionally. Maybe it is because we can have a direct feedback with this aspect: that we can see with our own eyes the reality that surrounds us, and its changes impress us immediately. In fact, when we look at a plant, our mind begins a series of interpretations, a synthesis of rational and intuitive emotions, and weaves a series of reports by the plant itself and the emotions received from it. All of this is influenced both by our culture and our genetic heritage[1] (Tiezzi, Marchettini 1999).

The economic aspect of sustainability is also widely debated and evaluated, as in the case of the environmental aspect being measured and quantified through objective data, so it is more easily verified. Much more delicate and complex is the promotion and evaluation of social sustainability, since it brings with it a number of qualitative and subjective aspects, that are difficult to identify unambiguously. The more that an environmental issue becomes relevant and shared, the greater is the risk of the proliferation of a phenomenon that has been defined by the term greenwashing[2], a series of marketing strategies designed to highlight a range of products sensitive to sustainability issues, in order to make them more attractive in the eyes of the consumer, thus dwarfing the actual meaning of sustainability.

Research goal and objectives

The United Nations World Commission on Environment and Development (WCED) in its 1987 report Our Common Future defines sustainable development as a «development that meets the needs of the present without compromising the ability of future generations to meet their own needs» (WECD, 1987). After this definition many others were formulated and consequently the notion of sustainability has emerged.

Since its formulation to date, this binomial has been widely used

and misunderstood, becoming in accord with Serge Latouche (2012) a generalized and sometimes mystifying expression. Therefore almost thirty years after its formulation, I think that it is a concept that needs to be reviewed, because the word sustainability, considering each of its forms, has been manipulated. This could be a consequence of the use of ambiguous communication strategies and market interference, which presumably helped to create and feed a confused debate on this topic (Owen, 2010). In light of these issues there is the need to analyse this topic critically, to gain more awareness about the influence which it has exercised on our perception of reality, studying the scenarios that have been opened in different disciplines and cultural areas, in particular in architectural debate. With regard to this specific topic, the research aims to evaluate the problems identified, the answers made and failures, to develop new hypotheses.

After the Brundtland Report numerous summits which have enriched the concept of sustainable development followed, reducing it to three spheres of influence, with the aim of translating the theoretical aspects in operational strategies, through specific policy choices and procedures, such as the enactment of specific regulations[3].

The goal of this research, albeit ambitious, is to shed light on the relationship between the effects of sustainable development and architecture, considering as objects of the analysis the product of sustainability, reflecting on some very important dynamics: what results have brought the interactions between the product sustainability and the man-made environment? Have the principles of sustainable development been observed in a consistent way? What objectives set at the theoretical level have been translated consistently on a practical level? Are there other possible scenarios that have not yet been assessed?

Which product, more than any other, have generated doubt creating confusion, or sending deceptive messages, considering the original objectives of sustainable development?

Applied methodologies

The complexity of the scenario allows a choice of methodological approaches to the research. Thus the research proceeds first by induction, identifying the subjects and the critical issues related to them, starting from the basic formulation of the subject itself and the direct consequences of it, through to the analysis of the most influential authors and the historical context in which they arise. Thanks to the

results of this analysis, the research proceeds by deduction to the origin, that is the basic formulation of the subject (sustainable development) and its consistency with the objectives set, assessing the results of research in the conclusions.

It is important to highlight the originality of this approach, which is a review of what happened after the definition of the concept of sustainable development through the examination of architectural products, with a phenomenological vision.

Following the method described, the research is divided into three main parts: the first part of the study describes the concept of sustainable development, starting from the description of the scenarios that led to its definition, researching its historical and epistemological bases, outlining a cultural history of sustainability. Then the concept of sustainability is defined in its three main aspects and the objectives that it has set. This kind of investigation, which takes into account how sustainability has become part of the collective imagination reveals the presence of relevant consequences of sustainable development, which I define in the course of the research as the products of sustainability. The products of the sustainability are the phenomenological basis departure from which gradually the research comes back towards the generating elements themselves (sustainable development and sustainability).

The second part of the research deals with the concept of sustainable development, applied in this case to architecture, has given life to the elements reproduced and reproducible, which in their turn have given rise to different trends. After a general description of the products of sustainability that mostly interact with the themes of architecture, the research selects some products considered suitable for the purpose of a deeper analysis; for example, a selection of the directives corpus issued by the European Community, in particular energy and environmental regulations and environmental assessment tools[4].

The choice is made to fall on these products and on the trends related to them because they have, or seem to have, a strong effects in architecture, in particular on technical, formal, communicative and economic choices. To assess the interaction of these products with the field of architecture, the research identifies parameters to determine their degree of influence on the project, their degree of consistency with sustainability principles and their ability to meet the objectives set by sustainable development, and finally, the presence of interference.

In the third and final part of the analysis will be assessed some

of the strategies that have been undertaken to achieve the objectives of sustainable development in architecture and what problems were encountered, with the possibility of developing new ones, or of introducing corrective elements inside of them.

Target audience, expected results and future developments

Sustainability issues enjoy great popularity, however a certain lack of critical approach to this topic has been detected. Although sustainable design is often focused on technical aspects or performance, this research aims to integrate them with a cultural and historical analysis, outlining a cultural history of sustainability, and to avoid omitting a number of aspects which if left unchecked in dealing with such a complex subject, could cause shortcomings and over-simplifications.

The research fits into the theoretical debate, but with repercussions in practice, since it is a discussion rooted in epistemology, integrating the analysis of the technological debate not only with the traditional methods of the discipline, defining a new kind of approach.

The results of the analysis will consist in the synthesis of a series of reflections resulting from the knowledge gained during the research path, allowing us to establish and describe the relationships occurring between the products of sustainability and architectural issues, including a series of cultural elements often ignored.

Conclusions

The research is still in development, but I can make some assumptions: in assessing the outcomes of the research. I will not focus exclusively on the consistency of the answers that have been given to the analysed issues (through policies, procedures, intervention programs), but also on the consistency of the requests that were made at the beginning.

The research may find the lack of a systemic approach to the complex problem of sustainable development, underlining the need to identify more flexible strategies. So at the end of this research I would say that: despite the criticism and mistakes made in the practices, aimed at promoting the concept of sustainability, there are elements that belong to this concept, recognized and shared, that have a direct and predominant influence in architecture.

These elements may need to be reinterpreted, and not abandoned,

because they can have a strong value in the design phase.

On the contrary, it might be inferred from the research that the concept of sustainable development is intrinsically bound to be unsuccessful, because it is eternally inconsistent since its formulation and the products of sustainability have betrayed the conditions that generated them. A different outcome might still claim that it is impossible, in some cases or with respect to certain issues, to overcome the ideologies and the partisan attitudes, because although the validity of some of the concepts related to sustainability is demonstrable, with more or less scientific arguments, some aspects of it can be disproved, and each of us might tend to stay true to their convictions in virtue of ethical intrinsic content of sustainable development.

Notes

1. The same concept is expressed Julia B. Corbett, in her book "Communicating Nature: How We Create and Understand Environmental Message" (2006).
2. Neologism coined in 1986 by New York environmentalist Jay Westerveld, comprising the crasis of "green" and "brainwashing".
3. Briefly retracing the fundamental steps that have succeeded the Brundtland Report, we find the definition of sustainable development later reformulated by the World Conservation Union (1991), in 1992 the United Nations Conference on Environment and Development in Rio de Janeiro, which raised the idea of sustainability as a concept articulated in the three dimensions of Environment, Economy and Society. From the Rio Conference was born the first tool for the practical implementation of sustainable development, Agenda 21.
4. To better describe the phenomena arising from the concept of sustainability in architecture, we must start from a wider point of view: currently we are in a particular historical moment in which we own numerous new technologies and new materials, sensing the need to employ them in a different way. It can be said that the new techniques have allowed new expressions of architectural culture, sometimes taking the upper hand on it. The set of these products give birth to real trends and generates the different trends that are found inside sustainable design. For example, directives and regulations have the task to translate

into operational terms a number of instances and problems encountered previously on the theoretical level: this is clearly the case also with regard to regulations on sustainability and the environment.

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The sustainability in the rehabilitation of minor historic centres. The case of seismic crater in Abruzzo Region: strategies and compatible methods.

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Abstract

The research links the issue of rehabilitation of the small historic centres, that characterized the Italian territory, to the environmental issue. The sustainable recovery is seen as opportunity to carry out a virtuous action in the territory, in the name of recognition of the importance of towns in the local organization, their environmental value and the re-use of an abandoned built heritage.

The interest for these territories, particularly the inner area of the Abruzzo Region, hit by the earthquake of April 6, 2009, has offered the opportunity to carry out a research that aims to rediscover the present elements of environmental sustainability and to propose the integration of new forms of energy efficiency.

The research proposes the development of an operative methodology that helps to overcome the gaps of the reconstruction process and those related to the promotion of energy efficiency in historical contexts. The main area of interest is not the built fabric, but the one complementary to it, characterized by open spaces and energy networks, of which main aspects are highlighted.

The development of design scenarios allows us to involve different and complementary technological solutions in compliance with the case study, following a successful overcoming of a complex process of compatibility.

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The methodology aims at the elaboration of codes of practice to be a support tool to main actors related to the post-seismic reconstruction to create smart minor centres, through the application of a network of different interventions.

It is being validated on a case study in the province of L'Aquila to verify the effectiveness of the presumed scenarios through the quantitative verification of the results and timing of application.

Keywords
Sustainability, Redevelopment, Minor Historic Centres, Compatibility

Introduction

Redevelop the existing building from an energy perspective is internationally a very topical issue and particularly interested is Italy, where the issue of property renovation represents more than 60% of the buildings production[1].

However, when the object of intervention is rich of values, introducing principles of sustainability in the recovery process is a complex objective: this is the case of the rehabilitation of small towns that characterize Italy, for a long time identified with the adjective minor, erroneous term arising from their dimensional characteristics, not qualitative (Secchi, 1984).

Although it is widely recognized the value of such heritage, the minor and abused, located mainly along the Apennines, have been affected for decades by conditions of depopulation and abandonment[2], due to the loss of economic power and the low quality of life for lack of services (Cervellati, 2009).

In recent years there has been a renewed interest in these centres, due to a variety of factors: first, the problem spread, as they are numerous in the area. Secondly, the recognition of the environmental value that characterizes them, and therefore the importance of the recovery in view of the preservation of the material and identity culture of places (Zordan et al., 2002).

Finally, in an era characterized by global energy crisis and by strong focus on environmental issues, it is important to resort to sustainable recovery, aimed at re-use to reduce soil consumption.

The research identifies its area of interest in the inner area of the Abruzzo region hit by the earthquake of 2009, where the latter has only aggravated an already critical situation.

The area included in the seismic crater[3], in fact, has been the subject of negative changes relating to the organization of social and territorial settlements, which have led to further deterioration and abandonment of those towns today also compromised in their building structures (Figure 1).

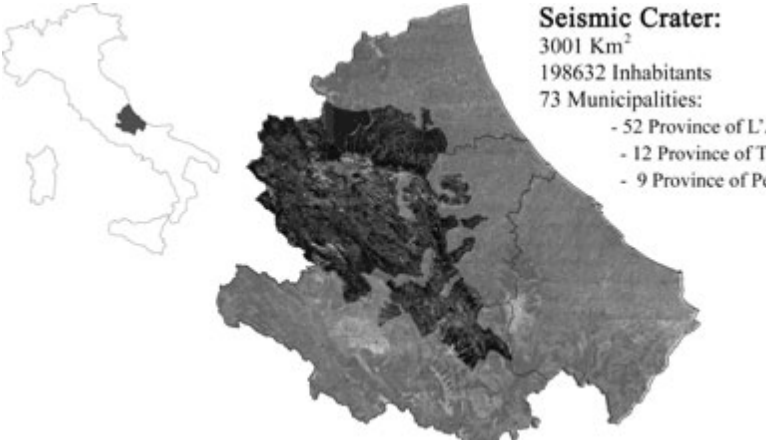

Fig. 1 The seismic crater [author]

Purpose and objectives of the research.

After recognizing the importance of the recovery of built heritage, of which we identifies the main characteristics, the research considers the earthquake not only as an aggravating factor for the already precarious balance of local communities, but as an opportunity for centres and their territory rehabilitation (Forlani, 2011), with the possibility of rebuilding, where it is possible and sensible, taking advantage of the technology quality to adjust the comfort levels to today's ones.

The goal is to exceed the regulatory limits identified in the first phase of the research both in the process of reconstruction, and in that of the national and regional legislation regarding the introduction of energy efficiency in the historical built heritage.

Thus, we propose a compatible process of recovery of towns affected by the earthquake, upgrading the performance indixes to today's users, in order to make attractive an architecture today disconnected from economic circuits, the only ones able to allow its survival.

The sustainability acquires a meaning in the proposed method if

considered as a comprehensive set of planning actions carried out at different scales of intervention: we need to move between the scale of built and the territorial scale in a congruent manner.

Starting from the recognition of the climatic and environmental potentiality of the area, the proposed methodology aims on the one hand to the reuse of a disused built heritage through the sharing of resources; on the other hand to exploitation, where it is compatible, of forms of sustainability, from sustainable mobility to renewable energy sources.

The methodological tool that the research outlines is thus aimed at the elaboration of codes of practice compatible with the minor historical centres in post-emergency situation.

The goal is to create smart minor centres through the promotion of a network system aimed at the transfer of people, information, and energy: such system is achieved by introducing innovative technological and compatible solutions in different areas and acquires stability if it is supported by realistic conditions of reuse.

Applied methodologies

The presented research aims at verifying the possibility to realize interventions that go beyond the built fabric, but rather to its service, intervening on open spaces system and on energy networks.

Thus the operational methodology aims to show how, through a careful meta-planning phase, it is possible to introduce systems related to energy efficiency, primarily renewable sources, even in the rehabilitation of minor historical centre.

In the light of examined state of the art and of post-earthquake situation of small towns, the study required firstly to identify the most appropriate approach to follow: a choice of method. Among the observed methodological approaches, the logic of case by case was considered closer to the object of the research (Rogers, 1957). It starts from a multidisciplinary analysis of the scope of investigation, and proceeds, after a diagnosis phase, with the development of design scenarios.

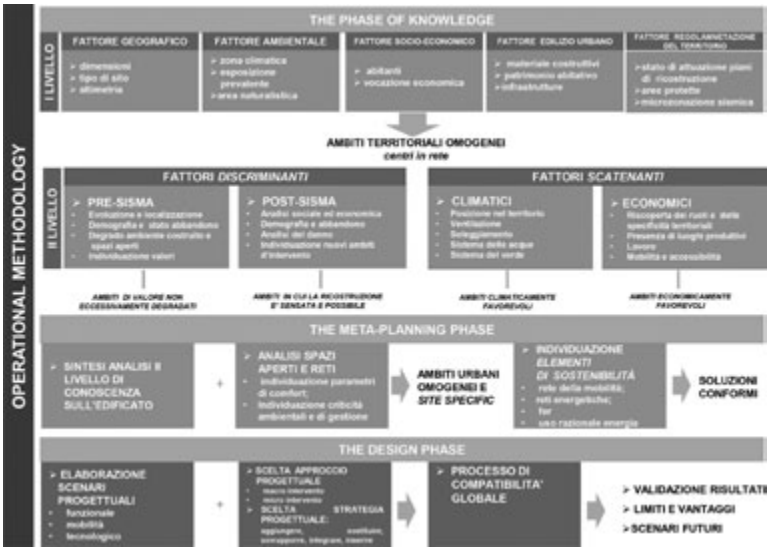

Fig. 2 The operational methodology [author]

It is essentially based on three phases, as showed in Figure 2:

- The phase of knowledge, which leads to the recognition of the town as a complex reality that cannot be separated from its environment. The identification of discriminating factors (pre and post earthquake) and triggering factors (economic and climatic), allows to identify design indicators in order to give intervention priority to some geographical areas.

- The meta-planning phase: after identifying the sustainable territories, it was decided to focus the attention on open spaces and energy networks, areas less investigated but that can offer significant performance improvements. The first are classified according to their morphological, functional and, especially, environmental aspects, through the analysis of climatic and biophysical factors, figure 2 (Sala, 2001). The analysis of the networks system (electricity, water, gas, sewer), through the in situ reconnaissance and data retrieval, has allowed us to highlight a difficult situation characterized by strong deterioration and lack of maintenance.

This leads to the identification of homogeneous areas for critical conditions and strong points, environmental and functional, where to locate site specific where intervene.

Fig. 3 Climate analysis: summer shadow, Fontecchio (AQ) [author]

The development of design scenarios, related to functional rehabilitation, sustainable mobility and energy networks, using different and complementary technological solutions, can be carried out only after satisfying a complex compatibility process, conducted on various levels (environmental, technological, functional and economic).

The identification of compliant solutions, occurred during a preliminary phase, was based on sustainability elements: rational use of energy, fulfillment of environmental comfort, sustainable mobility, efficiency of energy networks, exploitation of renewable energy sources. Of the latter, considering the sensitivity of the investigation area, we evaluate the insertion both in on-grid and off-grid modality (Marchionni, De Berardinis, Bellicoso, 2014).

Results and recipients of the research

The methodological process has required its validation on a case study considered significant: it has been chosen the territorial network characterized by Fontecchio, San Pio di Fontecchio and S. Eusanio Forconese, in province of L'Aquila. The goal is to verify

the effectiveness of the presumed scenarios through the quantitative verification of the results and timing of application.

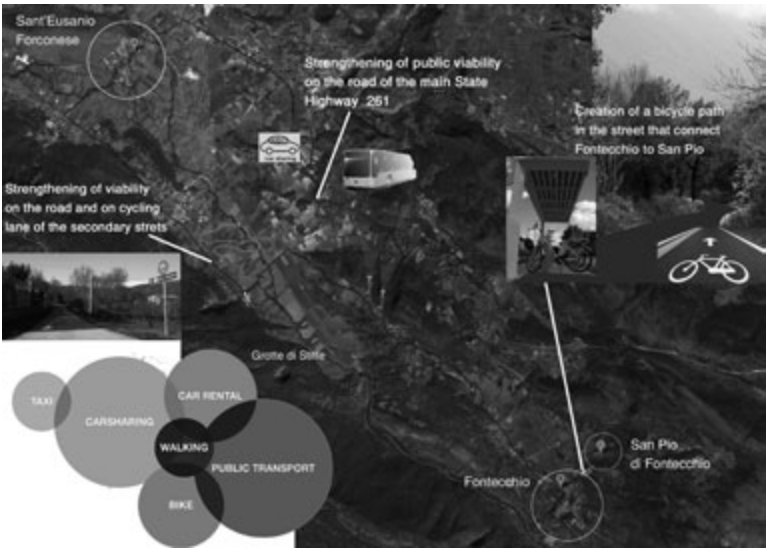

Fig. 4 Example of sustainable mobility scenario [author]

The methodology is intended to be a support tool to main actors related to the post-seismic reconstruction, therefore public managements and designers.

In particular, to the first we would provide a tool that overcomes the present incompatibility in SEAP (Sustainable Energy Action Plan), in order to combine the mere physical towns reconstruction with the technological and energy one.

Future developments

The next phase of the research aims at increasing the multi-disciplinary contributions related to the recovery process of the countries. In particular it is considered valid, in phase of knowledge, the deepening obtained by the use of technology by UAV (Unmanned Aerial Vehicle) for evaluation and thermographic study.

For the scenarios validation, however, it is necessary to enrich the methodology considering the economic component and the control of the management and maintenance process.

Conclusions

As highlighted by the proposed compatibility process, the problems related to the application of the analysed techniques are due to different factors: incompatibility with the context, technical deficiency, excessive costs, unfavorable times of realisation.

However, the test on case studies shows how, recognized on the one hand the values to be respected, on the other hand the need to introduce forms of energy efficiency, it is possible to overcome the normative and bureaucratic impasse that now prevents the recovery of abandoned territories.

This methodology, which can be enriched with a lot of technological solutions offered by the current market, provides an organic method that avoids the simple application of standard solutions and use of market products, but rather prefers the approach to the single case, that is a key concept if we truly want to respect and take advantage of the specificity of each context.

Howewew, even if it starts from the specific investigation context, which determines many of the elaborated considerations, the intention of the developed methodology is to provide meta-planning indications generally applicable to other sensitive areas hit by emergency situations.

Notes

1. Data by Cresme (Centro Ricerche Economiche Sociali di Mercato per l'Edilizia e il Territorio) 2012.
2. As is clear from recent studies carried out by Italian public companies such as Legambiente and Confcommercio, and private company like Norman Group, 72% of the more than 8.000 Italian municipalities have fewer than 5.000 inhabitants, of which 1.650 endangered towns in the projection to 2016. Source: Acts of the conference: "Ghost town. Hidden Treasures of minor Italy, June 23, 2006".
3. The area defined as seismic crater by the Ministerial Decrees succeeded after the earthquake (Abruzzo Decree n. 39.2009 and followings), occupies a portion of land of approximately 3000 square kilometers, comprising 73 municipalities (52 in the Province of L'Aquila, 12 in the Province of Pescara, 9 in the province of Teramo).

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Contemporary urban living: a new emergency. Studies of possible policies and sustainable technologies.

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Abstract

Research begins its path with the study about contemporary/temporary living culture and methods, in a journey between architecture and anthropology, within strong marginal contexts and specific urban phenomena, a circumstance for reflection on topic of living, on poverty. Field experiences (Rome, the Balkans, Cairo and Central America) develop following observational, listening and attendance methods, working in multidisciplinary team. The "respectable" living, the right of a house is a basic human right, approved by over 130 countries that signed the declaration of human rights in 1948. Research studies the event of a possible guarantee of the house where this right is approved, protected, supported by a politics of urban living. Going through models and experiences of some European references up to Italy that search house, it is possible to define suitable response strategies about living topic applying a sort of binding and intersection among its three different moments, yesterday/today/tomorrow.

Two different Metropolitan Areas are inserted in the path, two built up area, urban galaxies are compared. It is another urban journey within two almost opposite worlds, an extended dimension but also on urban scale; a system that moves, interacts, tries to organize and rule in both cases with its different dynamism. A mirror of dynamics between the north and south of the world is represented by Gran Lyon (GL), French model that protect the living right and Guatemala Metropolitan Area (GMA), model that omits this right. Living technology is the step that enclose the circle or maybe it opens many others. Research, between good practices and experimentations, should translate in sustainable living solutions the search of case studies and fulfillment to live in emergency, low cost, interpreting complex needs.

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A path in the real world and a recall to responsibility of making architecture as a social responsibility.

Keywords
Poverty Living, Social Housing, Public Housing Politics, Informal Living, Temporary/Contemporary Models of Urban Living

Introduction

Contemporary urban living is the theme of interest. It is an event that have strong poverty effects on living itself and in the background, the growth of worldwide urban population, social-economics and cultural changes of globalization of our planet. The aim of research is to investigate new urban living forms and methods (needs, poverty, architectural lost focus, city planning). The idea arises from a personal interest and the curiosity to investigate this event in its complex forms, particularly in different urban contests by a direct experimentation starting from a real description of living question.

In large metropolitan areas, which have quite literally exploded especially over the last few decades, confirmation is given by the fact that the urban population is overtaking the rural one in 2008[1] , housing demand has changed, there is a marginality which is the consequence of an exclusion from the market due to heavy building speculation.

Therefore, more than half the world's population reside in urban areas, but urban poverty is growing. Report of the United Nations Fund for Population (UNFPA). Women, minorities and the poor are most vulnerable, one billion people worldwide live in slums, 90% in the poorest countries, in poor and un-healthy conditions. In 2008, for the first time in history, more than half the world's population, 3.3 billion people reside in urban areas. A number expected to grow, as expected, to nearly 5 billion in 2030, except for reversing that trend, affecting mainly the medium-sized cities. Meanwhile, between 2000 and 2030, the population in Africa and Asia will have doubled and many of the new urbanites will be poor (Fig. 1).

Fig. 1 Informal/formal city Morumbi San Paolo, Brasile.
[source: http://heckeranddecker.wordpress.com/2008/10/23/vernacular-urbanism-part-iii/]

But above all else, the urban community we live in, that we are part of, is more and more of a multicultural nature, and the needs of the inhabitants are complicated to decipher. Within the overall scenario emerge episodes and situations of urban decay, shanty towns, illegal building, temporary settlements of an informal nature (which often end up becoming permanent), occupied by those who "arrive, set up house, occupy, invade"; areas which often house immigrants, part-time and seasonal workers, evacuees, clandestine migrants, and nomads. The habitat therefore represents an emergency and above all an urgency to respond to the needs of housing. Access to "dignified housing" is hard, new forms of social unrest too often give birth to episodes of social conflict following evictions or incidents which produce victims amongst the more impotent subjects of housing exclusion. The problem, therefore, is not merely urban, but first and foremost socio-cultural, it has to do with the urban policies of acceptance, and, in particular, those concerning housing.

Purpose and objectives of the research

The object of the research is the [new] living question that requires an interdisciplinary effort with a cross-sectional survey on different scale to be comprehended. Doctoral school is classified in three different disciplinary areas of work and investigation: city planning, recycling and architectural technology gather up in one keyword that is the name of the Doctoral school itself, Redevelopment and recovery settlement.

The survey field in which studies, reflections and first of all direct experiences are carried out, is the urban margins and poverty living in great metropolitan areas. Contexts are strongly differentiated: emerging countries reality and rich countries (due to social-economic conditions as industrialized countries). Heterogeneous contexts experiences and opportunity for comparison and stimulus for research.

The research characteristics need a multidisciplinary approach especially of social-anthropological aspect type and an experimentation in the field with participant processes in marginal context of urban areas that notice the living needs. In this way the research defines references on possible politics and sustainable technologies.

Applied methods

Different research and survey instruments are applied: reference framework verification and state of the art (participation to several conferences, seminars and study days); experiences in the field (workshop, critique analysis of good practices and living politics); two research periods abroad, in Lyon and City of Guatemala.

In particular:

- Collaboration in a European research project: "Rom and Sinti residential villages between identity and difference", Research carried out at the Ateneo Federato dello Spazio e della Società, Valle Giulia Faculty of Sociology and Architecture, Sapienza University of Rome, Studies of Rom, under Prof. Arch. L. V. Ferretti.
- International travelling seminar: "The right of the Rom to live across Europe, Beyond legal fields and illegal shantytowns. A study case between Rome and Belgrade", direct field experience through reconnaissance of certain situations in the urban areas of Rome, Belgrade and Skopje, through a study of the complex housing and socio-cultural theme, in order to outline project strategies to intervene in the urban fabric, experimental projects on low-cost housing, extendable to self-construction.

- Cairo - Workshop "Inside the City of the Dead", shared planning experience, coordinated by Prof. Marianella Sclavi and Paola Bellaviti, Milan Polytechnic with Live Slum (Fig. 2).
- Project with international cooperation, Sapienza University of Rome – Universidad Rafael Landivar, Indis department. The project involves the establishment of an operative guide for renovation interventions in the informal settlements of a metropolitan area of Guatemala City, in particular, the reference study case is La Paz of the municipality of Villanueva. The results of the research are published[2].

Fig. 2 Urban living, City of the dead, inside cimitery, Cairo, Egypt. [source: Cairo's Informal Areas Between Urban Challenges and Hidden Potentials - Facts. Voices. Visions]

The working method and the elaboration of collected materials and experiences made in different contexts constitute the focusing on this [new] emergency in fast growth above all in urban and metropolitan areas of strongly opposed countries. Research structure is defined in four parts as follow:

- Part 1 Urban living: contemporary/temporary poverty.

Investigation on living cultures and methods between architecture and cultural anthropology in strong marginal context and complex urban events. Large cities considered are Rome, Belgrade, Skopje, Cairo, City of Guatemala. These experiences are developed using observational, listening and participation methods and experimentations with local community.

- Part 2 Living Politics [re]think about living. The residential building is a need but also is an symbol of identity a reference to a place or a context as a city, is the right of a house[3].

The research studies the event of a possible house guarantee where this right is approved, protected and supported by an urban living politic.

From the study of European models and experiences to the Italy that search home comprehension[4].

- Part 3 Built up area: Gran Lyon (GL), Guatemala Metropolitan Area (GMA).

Two different metropolitan areas are compared. In the north of the world: Gran Lyon, in full European dynamism, city of culture and future, model of a web in the territory in which the living is a focus of the urban planning and redevelopment. In the south of the world: Central America (GMA), a disorganized reality to be urbanized, in continuous emergencies, with a complex social framework, an economy that Europe and rich Countries are taken advantage of. The strength of the case in the north of the world coincides to the context deficiency in the south.

- Part 4 Living technology. Good practice and experimentations.

A path between the real need (extreme and medium) in more or less complex urban dynamism and the living technological project. The house is an object that require continuous experimentation to be realized due to the changing needs. Possible solutions, techniques, materials, applications of unlimited combinations, low cost technologies selection, emergency living are reported. Moreover tendency projects for high density living, changes, renovations, demolitions, and re-building in all its forms. The research project that follows a comparison and an exploration between the north and the south of the world even in the technology, investigates and answers considering their differences. Contemporary living concept must be supported by flexible technologies capable to materialize built spaces, interpret new social dynamism that can be cosmopolite, multicultural, wanderer, contemporary, representing a customize answer. Furthermore each part is completed by significant voices of the path that become research contributions (as interviews and/or thematic essays), typical of each research part.

Research subjects

The living research is strongly centered on new needs interpretation, therefore citizen who is the starting point of the studies path and experimentation on field. Particularly the elaboration of some operational instruments, resulted by an International Cooperating project, are the local community, the administrations who are experimenting in the GMA (fig. 3).

Fig. 3 Slum La Paz – Guatemala City. Habitat poor condicion. (photo archive)

"(…) the reduction in habitable spaces was not only not solving the problem of requirements but caused instead the much more serious effect of encouraging designers to give up one of the fundamental tasks of architecture – that of intervening in the environment, landscape, city, each built house and dwelling, following a single coherent module aiming at quality. And therefore well-being, collective (…)" [5]

Results/Expected results

The expected result is a study about contemporary urban living, able to identify poverty forms using a multidisciplinary view and operating interest on different cultural contexts. The investigation develops between the north and the south of the world and have different loads, dimensions, characters and it is compared in all its contrasts. The investigation uses a report of solutions or case study that reflect innovations of low cost sustainable technologies tested or testable that should prompt to new possible scenarios of architecture.

Future developments

"How can the research proceed about living theme? First of all investing more resources on accommodation and controlling products quality; therefore making sure about projects and materials quality. The dwelling must be prepared to the inescapable destiny of our cities that will become increasingly multiethnic (…) I am increasingly convinced that the accommodation must answer to different culture of community, to different way of living private and urban spaces and individual, familiar and common dimension. Because is the architecture that must adapt itself to people and not the contrary." (fig. 4).

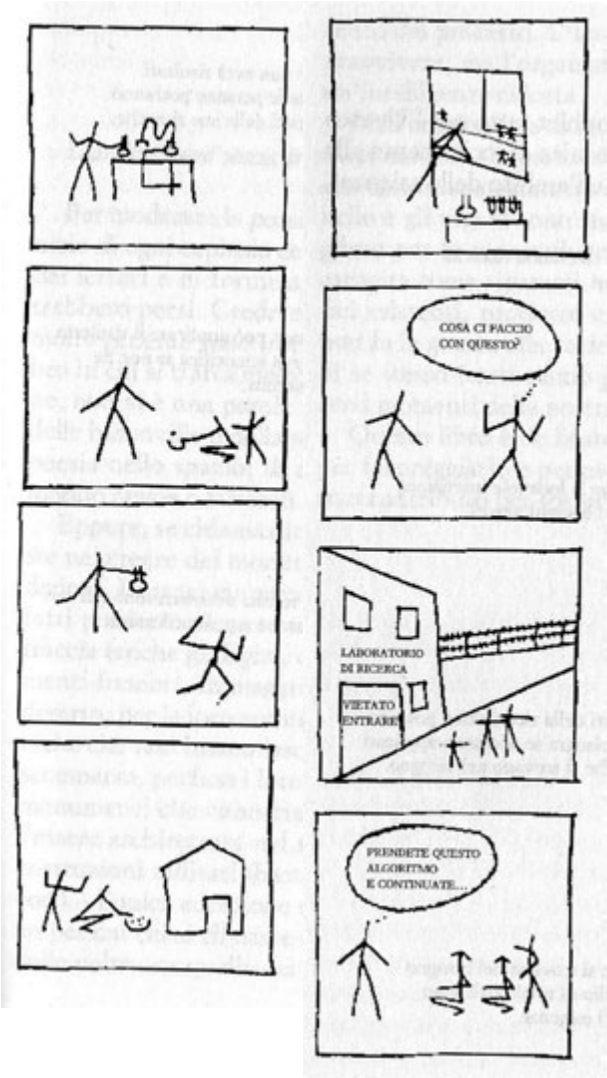

Fig. 4 Yona Friedman, L'architettura di sopravvivenza. [source: Una filosofia della povertà. Bollati Boringhieri, Torino 2009, p. 145 – 146.]

The research project started with the aim to explore the living problem, difficulty and poverty using a direct approach: stay and practicality on heterogeneous field, reading and interpretation ability, thumbnail definition of living problem. These are fundamental tools and methods to answer with possible strategies to new living politics and to rule and plan the territory to guarantee a fundamental right: the living. The housing demand is changed, the house is a remarkable problem for people who are well below market price, a condition in which a great part of worldwide population is and the future developments don't let think about any improvement. In metropolitan areas in which the living dimensional assignment cross the city and environment administration it is possible to define two case study:

1. Technology/experimentation as innovative research for solutions transferable to different contexts, necessary innovations to give a contribute to this contemporary item actually not overcome.
2. Research has as a focus the prefabrication as a possible path to re-innovate construction systems.

Conclusions

The research affects a contemporary survey field, the living and its complexity, trying to interpret the new needs starting from a direct research on the field. An investigation path that undergoes some experiences of possible politics through the reading of models and strategies between past and present, up to a definition of sustainable solutions. The intent of the research, however, is not to conclude or to solve a starting problem, with a unique answer, with a strategic, planning and technological solution, toward the different complexities. It means to open further reflections, new perspectives for contemporary metropolis even if these urban contexts, destinations of the biggest migratory flows, seem to represent the highest emergency places, where the request becomes heterogeneous and where the answer becomes urgent, considering the urban population growth. Politics for the right to a house are the only possible support tool to guarantee and keep up a sustainable development. The new needs, the new users, the new request cannot have an answer by obsolete tools that don't allow to interpret the social-cultural framework changing related to an economical and real

estate crisis that overwhelms the living theme. New models and new way of living necessitate to a planning and technological experimentation that absolutely must go through the two previous steps, the need and the right, because the living is a sensitive theme of responsibility for the architects.

The terms and possible (experimental) solutions to resolve these conditions should be the focus of urban policies. (fig. 5)

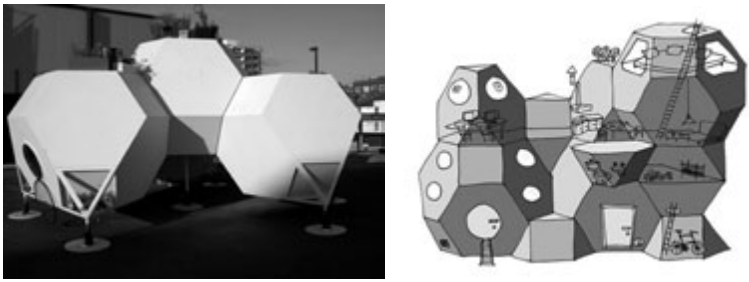

Fig. 5 Manual for Micro Dwelling (http://n55.dk/MANUALS/MICRO_DWELLINGS/micro_dwellings.html)

A critical survey will be the basis to find possible technological experiments for living, in order to a full-urban environmental project. The construction and manufacturing technologies industry doesn't offer an "appropriate" contribution to solve the problem, especially a sustained response.

A solution dictated by urgency doesn't respond to the problem. The emergency should be the occasion to open a road towards a real and serious political strategy for the home, sending it to that location the construction world. The project will propose guidelines for the design project, with answers to architecture with environmentally sustainable technology. The intention is to offer contributions, with strategies and solutions architecture, sensitive and attentive to environmental and urban contexts, which are also an opportunity to upgrade the existing. The intent is to meet the requirements dictated by the economic, social and cultural situation. An appropriate sustainable living model, aimed at promoting the processes of social integration and urban regeneration. Interaction between experiment and sustainable cities and communities, not forgetting that "the city is not made of houses but of people. "We

architects - planners should consider how to continue searching of 'living', recalling that sustainability does not compromise the ability of future generations. Toward what ur¬ban future are walking ...?

"maybe we have to recover the love lost for nature,
when we fall in love with urban life …"
James Lovelock

Notes

1. Report of the UN Fund for population (UNFPA).
2. Silvia Covarino, (2010), "Guìa de diagnostico urbano – partecipativo para asentamientos precarios, con en foche en la meta 11 de los ODM", 2010, Universidad Rafael landivar, Sapienza Università di Roma. Guatemala City.
3. (With A. Cecilia Zurita F. e Mario N. Mansilla)
4. https://www.url.edu.gt/PortalURL/Archivos/69/Archivos/guia_de_diagnostico_urbano.pdf
5. The respectable living is a human basic right approved by over 130 countries that signed up the human rights declaration in Vancouver in 1948.
6. In Italy is necessary a stitch up and intersection action of its three different moments. The living path that twists and turns among politics and after war experiences realized; its results and strategies up to the actual complex framework of a social reality.
7. M. Guccione, A. Vittorini, (2005), Giancarlo De Carlo. Le Ragioni dell'architettura, Electa Opera DARC, pp. 32 – 33.
8. M. Guccione, A. Vittorini, Giancarlo De Carlo.Le Ragioni dell'architettura, pag. 33.

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Urban Agriculture: a strategy for the sustainable city

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Abstract

Urban Agriculture (UA), developed in several forms and contexts, is a trend acquiring strength as it responds to the common needs of environmental, economic, social and institutional sustainability of our cities. It contributes reaching a greener city carrying all the consequential benefits, it minimizes food production environmental footprint, it enhances local Km0 market, it enhances new jobs, it carries wellbeing, education, health, conscious food consumption and social interactions.

Urban Agriculture is definitely a complex phenomenon, which involves different discipline and approaches, and which it's acquiring interest and attention in the field of architectural research as considered a strategy for urban regeneration actions.

In the last few years it's possible to identify a large number of projects in the field of architecture and planning that aim to integrate agriculture at urban and building scale, non only making existing green areas suitable for food production, but also using alternative urban and building spaces such as courtyards, pocket spaces, brownfield sites, flat roofs, terraces. For this reason planners and architects are asked to:

Design solutions at different scales: city and neighbourhood planning, garden and open space design, building design, product and component design.

Understand how UA could be integrated and regulated becoming a new space typology and relating itself with politics stakeholders involved.

The research aims to:

- Describe Urban Agriculture in its complexity and in its multidisciplinary aspects;
- Describe the role of architects and designers in integrating Agriculture in the urban context;
- Analyse possibilities and challenges of Urban Agriculture for our cities and its the social, economical, environmental and technological implications;

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- Understand Urban Agriculture feasibility and its potential for the sustainable city. Therefore it will be given an analysis of a range of possibilities of integration between agriculture and architecture. Those will be classified according to the urban/ building space typologies identified as suitable, and subsequently linked to technological, functional, social, environmental, architectural and urban aspects and requirements involved.

The classification will be furthermore applied to the case study of the city of Florence, as a tool for designers and legislators usable to better define future projects.

Keywords
Urban agriculture, Urban regeneration, Technological Integration, Inclusive city

Introduction

Contemporary towns and megalopolis in the devolved world need to face several problems in terms of sustainability, health, quality of life and environment: lack of green spaces, bad air quality, bad water management, degrade, abandoned spaces and low environmental quality. Furthermore food need is a criticism affecting huge urban areas as it implies: vast land exploitation, pollution due to transports and crop methods, resource consumption. In this context urbanization and globalization brought out other issues such as health and alimentary diseases, and loss of food awareness, due to lack of education and separation between food production and consumers.

In a large number of countries a trend is emerging as a possibility to face the challenges above mentioned: Urban Agriculture.

With the term Urban Agriculture (UA) we can define an industry (Luc J.A Mougeot) located within of a town which grows or raises, processes and distributes a diversity of food and non-food products, using mainly human and material resources, inputs and services found in the urban area, and sharing outputs and ecosystem services to the city itself. Urban Agriculture it's definitely an issue that involves different disciplines, and since it consists in a range of agricultural (and related to) activities that take place in a urban context, their architectural integration at different scales need to be investigated. Architecture is therefore asked to find solutions in terms of space, technology, functions and

to understand UA effects on the urban environment.

Recently, projects in the field of architecture and planning, that aim to integrate food production in urban contexts with different spatial and architectonical solutions, are spreading especially in the most important cities of North America, Europe, Australia, China and Japan.

Through an analysis of the state of the art numerous examples can be identified:

- Community Gardens in NY, San Francisco and Chicago and Jardins Partagées in Paris;
- Commercial Roof Top Farms and Greenhouses of Brightfarms and Lufafarms;
- Vertical Farms, with the first one built in Shangai;
- Educational Vegetable Gardens in Schools and Universities;
- Hydroponic rooftop vegetable garden at BellBook&Candle Restaurant in Ny;
- Backyard vegetable gardens;
- Brownfield sites reused to host food production or other activities such as selling and preparing, as in the experience of The Plant in Chicago;

It's clear that many types of urban spaces were used or are being investigated as suitable to host food production:

- at urban scale: parks, gardens, vacant lots, brownfield sites
- at neighbourhood scale: courtyards, pocket spaces, backyard gardens
- at building scale: roof, terraces, facades and the indoor spaces

Fig. 1 - Gotham Green rooftop commercial farm Brooklyn, NY.[www.gothamgreens.com]

Fig. 2 - Community Garden in an abandoned area owned by da GM Supplier of the Year Ideal Group.[http://girldriver- girldriverusa.blogspot.it]

Multifunctional Urban Agriculture

An Important factor that characterises and enriches successful projects of Urban Agriculture is its multifunctionality, as the interventions have the potential to fulfil various needs and functions at one time. First of all it's necessary to underline how crop production it's only the first issue concerning Urban Agriculture, as it implies also: food selling, preparing and serving, alimentary education, recreational activities, therapeutic activities, city waste management. Therefore restaurants, retail stores, supermarket, hospitals, canteens, schools could introduce food production different aims, or could be linked in an urban local food chain.

Furthermore introducing crop production in urban contexts responds to the common need of a sustainable city in terms of environmental, economic and social sustainability. Indeed it contributes reaching a greener city carrying all the consequential benefits, it minimizes agriculture environmental footprint (in terms of transport and soil consumption) permitting a local Km0 production, it produces new jobs and enhance the local retail market, it carries wellbeing, education and health due both to the conscious consumption of food and the farming activities, it enhance the citizens' participation and inclusion in the town management. The well-known community gardens in in NY respond to the citizens' requests of shared space and sociality, provide a space for food production for low-income families, permit product selling, host educational events for kids.

Fig. 3 - Brooklyn Grange Rooftop Educational Farm [http://brooklyngrangefarm.com]

Fig.4 productive hydroponic rooftop of Bell Book and Candle restaurant NY [www.telegraph.co.uk]

Architecture and Urban Agriculture

Clearly our cities and our buildings are not conceived to host agriculture and some criticisms need to be solved: small spaces availability, polluted soil, artificial surfaces, building static requirements. Different technologies are investigated or adapted (and transferred) from agriculture to architecture (greenhouses, hydroponic growing systems, containerised growing) in order to make the abovementioned spaces suitable for crop production.

The role of architects acquires importance in this new field of project in order to find solutions for the integration of agriculture at the urban scales involved. It ranges from planning, landscape and garden design, technological component design, to industrial design as in the case of indoor growing solutions such the Vertical Garden by Danielle Trofe.

Urban Agriculture is a complex and rich phenomenon that, despite it arises in split (and sometimes also spontaneous) experiences, has the potential to become a concrete strategy for the future city.

Urban Agriculture carries benefits and implication toward urban sustainability in terms of environmental, economic, social and institutional sustainability as it involves and involves several aspects of

contemporary urban life: city greening, shared spaces, requalification of abandoned or degraded areas, buildings and urban periphery fringes, local healthy food production, education, relationship strengthening between city dwellers and agriculture, job creation though a new urban local food market. These issues make UA a successful strategy for urban regeneration projects.

Research Objective

Food system is generally regarded as an agricultural and rural issue not considering its impact on the city, the place where food is consumed and sold, (K. Pothukuchi , L. Kaufman 1999), in terms of transport, retails, markets, canteens, restaurants. Nowadays projects aiming to integrate food system politics at urban scale are developing with examples of Urban Food Plans (Detroit and Portland in the U.S. and Pisa in Italy) and its becoming clear that food it's also an urban issue. Planners and architects, joined with economists and politicians, should investigate an Urban Food Planning sustainable and respondent to the users' needs. Urban Agriculture places itself in this process, needing research to be pursued.

Nowadays most of UA experiences arise from citizens' and users' will, who take possession of spaces and modify them (sometimes also independently) giving them new quality and function, or, on the other hand, from extraordinary planned projects.

The presented research aims to develop the theme of Urban Agriculture as a strategy for urban regeneration of cities and metropolis of developed countries, and as response to the citizens' exigencies registered.

The research general objective is to acquire scientific knowledge on the phenomena and to lay the foundation of literature and project guidelines on Urban Agriculture from an architectural point of view. Attention will focus on technological and economical feasibility of the integration of food production in urban settlements, relating to its social and economic benefits and implications.

Specific objectives

Specific research objectives are:

A) Definition of the possibilities and the challenges of Urban Agriculture and its typological classification through the following parameters:

- Available space: identification of space typologies, from urban (gardens, brownfield sites, pocket spaces) to architectural scale (rooftops, terraces, facades), that can be designed to host crops;
- Use: description of hosted functions and activities that can be pursued through a food productive use of each kind of space identified (auto consumption, education, selling, recreation, therapy);
- Technology: description of UA integration feasibility and possibilities in terms of technology;
- Requirements: space design and integration requirements;
- Benefits: definition of the social-economic-environmental benefits that UA typologies bring;

B) Definition, through the previous described parameters, of the Tool for Urban
Agriculture: TUA, useful as a project tool or guideline.

C) TUA proof on a case study: a neighbourhood of the city of Florence will be analysed in terms of possibilities for urban Agriculture as described below:

- Quantification of the citizens' interest and requests
- Quantification of space availability and typologies
- Local urban and building regulation analysis, identifying possibilities for UA integration and upgrade.

This research section aims to show an overview of the potential of the city in terms of Urban Agriculture, in order to make the public administration aware on an issue that is already acquiring interest as demonstrated by the community garden "Orti DiPinti" in Borgo Pinti and some temporary installations settled by the Community Garden Association.

D) Florence site-specific Business plan definition for those UA possibilities identified, in order to define their feasibility and future implications in technological, economic and social terms.

Research Methodology

Research A) and B) parts methodologies:

- Desk research and literature review on Urban Agriculture,

case studies and best practices in different countries (especially Europe, North America, Australia, China and Japan)
- Existing Food Planning charts or documents analysis, Urban Agriculture Law analysis (San Francisco, Detroit)
- Urban Agriculture technologies and implications research and analysis
- Direct experts' interview
- Experts in planning and agriculture support
- Research C) part methodologies:
- Distribution of specific a questionnaires to test the interest and the citizens'awareness toward Urban Agriculture
- Local urban regulation analysis
- Analysis, graphic representation and quantification of the spaces available for urban agriculture (according to the classification above mentioned) identified trough the local regulation papers, satellite images and direct investigations.

A neighbourhood of the city of Florence has been used as case study, in order to define a methodology of approach.

Research part D) methodologies:
- Business plan definition
- Experts support

Expected results and results

Urban Agriculture usually develops as a bottom-up phenomenon that's acquiring the interest of community and decision makers. Knowledge divulgation to professionals and to public administrations involved becomes necessary in order to institutionalize UA and to take advantage of it in urban requalification strategies.

Results

TUA Tool for Urban Agriculture has been completed according to the scheme presented below, classifying and ranking UA possibilities according to the identified parameters.

Columns:
- Space typology: flat roof, façade, terrace balcony, green area, paved area, water

- Land use and building typology: housing, school, hospital, canteen, supermarket, public garden, residual space, vacant lot, brownfield site etc.
- Activity aim: auto consumption, selling, serving, therapy, education.

Rows:

- Activities: crop, preparation, education and divulgation, events
- Traditional and Soilless growing and integration technologies: in soil, in pots and containers, raised beds, green roof, greenhouse, hoop houses and growth cells, vertical green living wall, vertical farm.
- Benefits: environmental, social, economic
- Weaknesses
- Requirements: security, wellbeing, usability, managements, appearance, environmental protection, integration

Fig 5: TUA scheme. [author]

Fig. 6: TUA development example for a residential flat rooftop. [author]

The 23 questions questionnaires spread involved 100 people of different age: under 35 years old, between 35 and 60, over 60. A few topics were investigated, such as: the place where fruit and vegetables are bought, main influences on purchase choices, perception of the effects of a local km0 market in terms of wellbeing, product freshness and quality, price, number of urban farmers, awareness on urban agriculture. Some results are presented below.

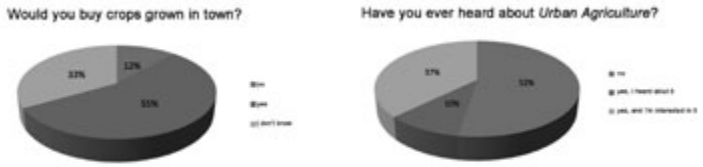

Fig. 7 Questionnaires responses. [author]

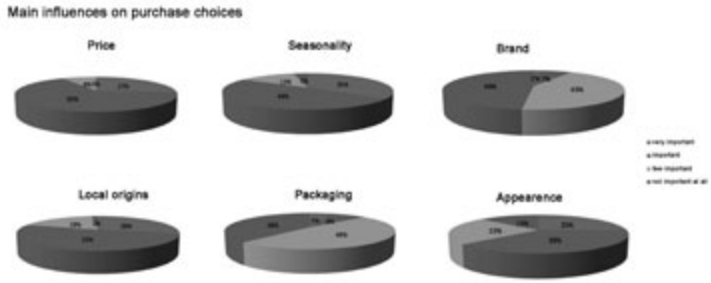

Fig. 8 Questionnaires responses. [author]

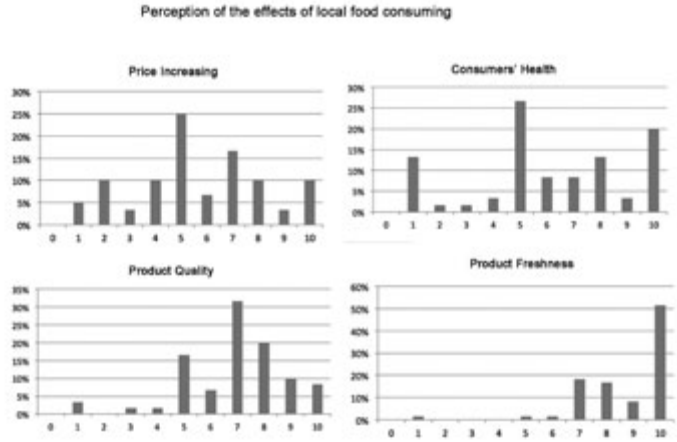

Fig. 9 Questionnaires responses. [author]

The Florence case study analysis is showing the town potential for Urban Agriculture

Integration. The illustrative Utoe 2 assessment displays an average of:

- 140 000 m² of public green spaces available
- 95 000 m² of private residential backyard gardens available

- 4000 m^2 of flat roofs available on supermarkets' stores, 8000 m^2 of flat roofs available on school buildings
- 7000 m^2 of public green residual space (flowerbeds and riverside)

Fig. 10 Relationship between flat roofs available and building types, in this case: schools and supermarket. [author]

Expected Results

TUA will be proof on a Florence neighbourhood showing:

- Assessment and graphic representation of urban/building space potentially available
- Possible UA integration evaluation
- Local regulations possibility and prohibitions

Site-specific Business Plans plan will be developed, in order to define UA integration feasibility and its future implications for the

urban context in technological, economic and social terms. Those will show how UA may be a strategy for further urban regeneration and the future sustainable city.

Research beneficiaries

Research beneficiaries and stakeholders are:

- Public Administrations. They will be given a strategic, procedural and technological plan on the potential and the possibilities of integrating agriculture in a urban context. Furthermore they will be given knowledge on its implications and on the possibility of enriching the city with new forms of market and activities.
- Architects and Designer. They will be given a tool on the possibilities and challenges of Urban Agriculture in terms of urban and building integration.

Indirect beneficiaries that would take advantage of a Urban Agriculture network and infrastructure are commercial and business activities that will be given the possibility of enriching their business with a km0 crop production, serving and selling, or with additional services such as education and therapy.

Further Research

Further research should be pursued in order to upgrade local regulations in integrating Urban Agriculture in terms of land use, space use, building space use, land of space renting or leasing possibilities, activities and uses, management. For this reasons the research pursued may result into a definition of Form Base Codes on Urban Agriculture.

The aspects investigated need to be further developed as linked to additional issues involved: water management, energy management, market possibilities. As above mentioned Urban Agriculture need to be canalized both in an Urban Requalification Strategy and in an Urban Food Planning Strategy.

Conclusions

Urban Agriculture is acquiring importance and interest, and a common awareness of its role for our cities and metropolis is well noticed. Indeed Urban Agriculture place itself in the debates on the smart and sustainable city engaging different disciplines (sociology, economics, politics, and architecture) as its complexity and

multidisciplinary features require a whole gaze. Architects are involved in the field as carrying the capability and the responsibility of designing the urban environment according to users' needs, and the increasing demand of growing crops in town requires a rethinking of the urban open and built environment.

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The rating system LEED for Healthcare facilities in Italy

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Abstract

The research operates in the field of architecture's management and explores the assessment's tools and methods.

The tool analysed is the LEED certification. The aim is to understand the criticality of the transition from a global to a local version, applied to the Italian reality, using the rating system LEED for Healthcare.

The study is done keeping a critical vision of the tool and it is put into effect with a first proposal of Italian LEED for Healthcare.

Keywords

Rating system, Healthcare facilities, Community Hospital, Sustainability, Quality System

Introduction

Today the environment is strongly influenced by the human action. Every act or choice we do has consequences on what surround us and our habitat is affected by this. Obviously, construction industry has a fundamental role in this field. It can be defined as real first act of human manipulation of the environment that, evolving in the centuries, is moving away from sustainability.

High CO_2 consumption and emission, caused by construction industry during the whole process, cause the need to implement energy saving policies, promoting quality for territory interventions, to reduce pollution and emissions.

For these reasons it's important to define tools that allow to make sustainable buildings and aware choices for the promotion of quality construction. The pinpointed strategies will allow a more healthy and balanced relationship between man, architecture and the environment.

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The research operates in the field of architecture's management and deals across two subjects: assessment's tools and methods and healthcare facilities.

The level of quality in architecture is defined by the capacity of managing the information transfer from one phase to another. This passage is supposed to not have loss and it should discipline the relations between the parties involved, allowing each collaborator to actively participate in the production of quality.

Pict. 1 Factors that determine quality in construction. [author]

To evaluate the specific quality of the operative context, it is possible to introduce the topic of the appropriateness of the solutions proposed.

The appropriateness is interpreted as the correspondence to the objectives of the intervention in relation to the peculiarity of the situation.

To evaluate the appropriateness it is recommended to refer to the following factors:

- adaptability to different sets of objectives or the extensiveness of a largest number of operators,
- cultural compatibility of technologies with the expectations of people,
- economic compatibility with available resources, compatibility with the social promotion,
- environmental sustainability of the technological choices.

These concepts have more validity in the field of healthcare structures, which functions and users require attention and special services. In addition, it should be noted that, because of the characteristics of healthcare buildings, it is necessary to pay particular attention to the methods and criteria for evaluation and to the design criteria.

For this kind of buildings, the aspects that influence sustainability

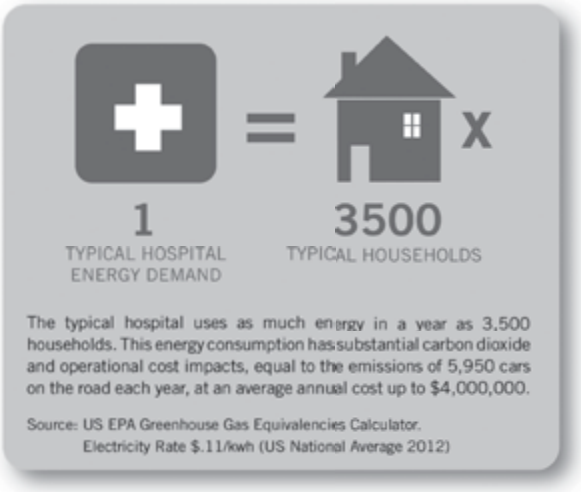
concern with two different fields: technological performances and human and psychological aspect, by the point of view of the patient and his family and by the point of view of doctors, staff and managers.

Healthcare construction is sustainable when it is able to reduce costs, improve cares and free resources first used in an inappropriate manner. Moreover health is not simply a state in which there is no disease, but a state of total well-being. Assuming this we can identify a close link between the diseases and pollution.

Moreover, healthcare facilities constitute a major portion of energy production, in fact the importance of their plants is second only to the industrial complexes.

So, the energy efficiency of this kind of structures shouldn't be entrusted to the designer's skills, but also to the intentions of owners.

Furthermore, the wellness of the patient is conditioned by different factors and some of them are determined by compositional choices such as: visibility of the exterior from the bed, presence of internal courtyards, natural lighting, natural ventilation, use of renewable energy as a positive message.



Pict. 2 Hospitals energy demand [source: US EPA Greenhouse]

These issues are fundamental for the promotion of a sustainable healthcare buildings industry, that may have positive results in the environmental and social fields. For these reasons it is important to consider them in the development of a tool to assess the quality and sustainability of these structures.

The aim of this document is to define actions and tools to incentive sustainability and quality in the construction industry, with particular reference on Healthcare facilities, through valuations, study and comparison of alternative solutions and statistics to find the best strategy for every situation. This can be reached with the use of evaluation protocols.

The evaluation protocols have a dual role. First they assure a valid tool to understand the quality and the pertinence of the solution, promoting a sustainable construction, with production of shared database. Second, they give methodological guide lines to perform a good design and realization of constructions, that can be used to guide the job of every workers involved in the construction process.

These tools are normally constitute by a list of good practice, combined with an operative manual for the comprehension of the parameters influencing sustainability and quality of constructions.

For the largest part of the existing systems, there is a limit given by local regulation. Only few instrument are usable to adapt the system at national contest, and it is for this reason and for the importance of communication with other realities that I have chosen to analyse the instrument with the best response and maximum diffusion on the global contest: the protocol Leadership in Energy and Environmental Design (LEED).

This protocol was born in USA thanks to USGBC . The protocol has been elaborated for the US reality, but his rational nature permits, upon a work of transposition from the US contest to other local system, to be successfully used in other nations, and to became a product valid for global level.

LEED is a construction and management standard based on a protocol, made of some principles like energy saving, use of recycled materials, control of the source of pollution and the engage to provide a comfortable working place. It is usable by designer and engineer for new building design and construction, but also for major renovation of existing buildings. This method is based on a check-list founded on ecological problematic analysis.

This organization of the tool permits it's easy to use in the design process, with the possibility to the define, from the first steps, the goals to catch up.

The final purpose of LEED protocol is to define an ecological "standard" that can be used to increase quality and sustainability in the construction trough the attribution of a score. The total of this score permits the attribution of a certification level.

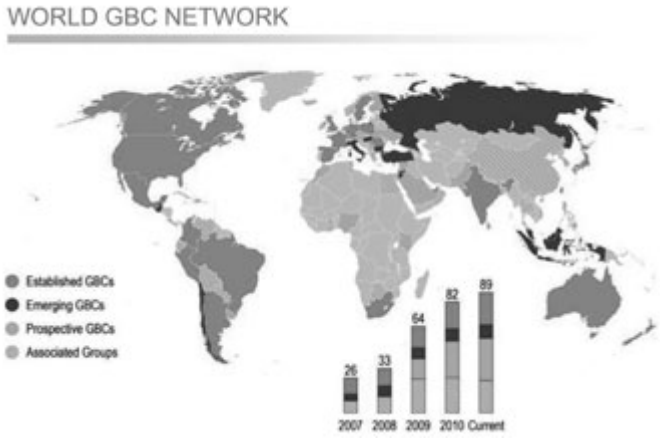
Aim and scope of the research

The aim of the research is to create the basis for an Italian version of LEED protocol for Healthcare facilities .

This thematic requests an high level of knowledge in two fields to obtain a valid instrument of valuation: the rating system LEED and the design of healthcare facilities.

The original protocol created by USGBC is, at present, valid and usable at global level.

The use of global version in a local contest, like the European or the Italian, could compromise the evaluation results because they are conditioned by different standards and points of reference. Moreover, the use of a global reference instead of a local in a different reality from the US, could increase the effort to obtain a certification, with loss of objectivity and comparability, that are the main characteristics of this protocol.



Pict.3 The world GBC Network. [source: USGBC®]

Climatic, geographical, constructive and normative contest are decisive in building construction.

The use of standard not linked with the operative contest, is not useful to reach quality and sustainability for construction.

For this reason, the GBC network works to transpose and adapt the global protocol, to different contests.

The efficiency of this protocol is founded in the great concreteness that links it at the design and building process, without this, the efficiency decrease.

The study for the creation of a "local version" is not a simple research of equivalent reference, but it is a work of adaptation and control of the contribute given by every reference in the final structures and how it can be inserted in the process of certification.

In particular, I want to perform a preliminary study with the aim of understanding the criticisms inside the passage from the global version to an Italian local version, keeping a critic vision of the protocol. This study will put into effect with a first proposal of Italian LEED HC protocol, that will need other in-depth analysis before being considered 100% operative.

Applied methodology

In the first phase of the research, two main themes have been analysed: the LEED protocol and the healthcare facilities design. This has been necessary to define the ambit of the research.

The analysis phase has provided direct and indirect survey.

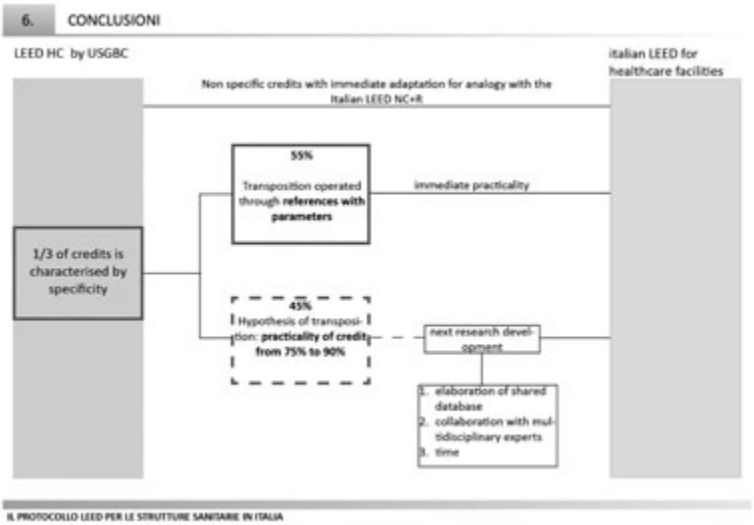
In particular, in order to reach the objective, it has been done a comparison between the existing versions of LEED : LEED New Construction and Major Renovation and LEED for Healthcare elaborated by USGBC, and the LEED New Construction and Major Renovation elaborated by GBC Italia.

This analysis had a double aims: to individuate the peculiarity of the protocol used for healthcare facilities and to understand the strategies, used by GBC Italia to elaborate the local version of the protocol.

Moreover, a direct survey such as the stage, I have had in France in a specialized healthcare facility designing studio, has been very important to understand the criticality in the process for the design of complex building, while the confrontation with GBC Italia exponents has helped me to have a great knowledge of the instrument.

At last, in the proposal phase, it has been faced the problem of the credits transposition, with a different approach based on the presence or not in the Italian/European contest of references with parameters usable for the transposition.

Indeed in the first case it is granted the immediate usage of the transposed credit, while in the second, it will be made an hypothesis to propose the transposition, which efficiency will be guarantee, in the next research development, through the elaboration of shared database and the collaboration with multidisciplinary experts.



Pict. 4 The result of the research. [author]

Recipient of the research

This research is addressed to those who are involved in the building process. First of all to the designers who will have more definite guidelines in the building process and the possibility of a rational comparison with other examples of healthcare facilities, allowing to everybody to improve the final products. The same, it will be useful to certifiers who will have a suitable standard appropriate to the structure to be analysed.

Furthermore it is intended for users and workers who will find more adequate and efficient facilities, as well as managers and to contractors who will be able to derive a cost savings in the management and increasingly accurate predictions on future expenditure.

Expected results

Healthcare facilities consume more than other buildings and must meet very complex requirements and regulations. Obviously it is not possible to think to reduce the efficiency of the healthcare facilities and it would not be a meaningful comparison, on the basis of the same standard, to analyse them with other types of buildings with different functions. For this reason, to define the LEED for the Italian healthcare, would mean to improve energy saving and the environment respect of the sanitary buildings. Moreover it would be useful to establish an effective scale on which to measure the sustainability of these buildings. This would increase the comparability, the self-consciousness and thus encouraging progress.

In addiction, the LEED version for healthcare construction have a significant importance from the economic point of view in order to make the Italian market competitive at international level, sharing the same language and the same parameters of assessment, although appropriate to their own situation.

It is a crucial step for the sustainable development of housing market. The LEED for healthcare should be a means that will help not only to verify, but also to understand and reflect, to move towards ever higher and sustainable goals.

Future developments

The research develops as part of a doctoral thesis with the temporal and resource limits that it comports. However, it is clear the interest to continue and complete this research in order to delineate a real standard addressed to healthcare buildings.

GBC Italia is doing his best to develop new local versions of the LEED protocol, either for neighborhoods or for historic buildings.

Enriching the network to be able to converse and compete in the international arena is a topic of great interest in this historical, political and economic moment.

Conclusions

GBC Italia, the organization who promote the LEED protocol in Italy, worked hardly to transpose some global protocols to local contests (LEED NC, GBC Homes, GBC Quartieri).

Between the versions missing transposition on local contest, the protocol for healthcare facilities is one of the most important because of the enormous energetic balance and for the importance of the specify due to the subject analysed.

Moreover, in Europe it doesn't exist any local version of LEED HC and in Italy we miss a standard reference for the sustainability design of healthcare facilities.

In this contest the LEED protocol could has a double value: an instrument of cultural promotion and an instrument to define the level of sustainability through the certification.

For these reasons the development of an Italian version could be interesting and useful.

This tool is also important at economic level because it permits to insert the Italian contest in the global economic contest with a common evaluation system.

Notes

The U.S. Green Building Council (USGBC) is a private membership-based non-profit organization that promotes sustainability in how buildings are designed, built, and operated. USGBC is best known for its development of the Leadership in Energy and Environmental Design (LEED) green building rating systems and its annual Greenbuild International Conference and Expo, the world's largest conference and expo dedicated to green building.Through its partnership with the Green Building Certification Institute (GBCI), USGBC offers a suite of LEED professional credentials that denote expertise in the field of green building. USGBC incentivizes LEED certification by awarding extra certification points to building projects completed with a LEED-certified professional on staff.

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Green Airport Design Evaluation Method and Tools

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Abstract

The paper illustrates ongoing research focused on the process of evaluation of project compliance with green building requirements during preliminary stages of the design process. The primary aim of the research is to develop method and tools to check and evaluate the sustainability design performances during the whole project development. The application case study is airport infrastructure design.

Airports can be constrained by environmental issues which restrict current operations and limit future potential growth. In order to maximize opportunities for growth, it is necessary to consider all the specific factors involved in airport design that can have an influence upon the environmental consequences of its subsequent operations and therefore impact upon integrated sustainability strategies. Life cycle and long-term planning of airport infrastructures also demand a systemic approach to meet the need for change through better definition of the design process and compliance with green building requirements.

A number of tools using sustainability indicators have been developed in the last two decades. International Green Building rating systems such as LEED, BREEAM, and others have been used as an effective framework for assessing building environmental performance and integrating sustainable development into building and construction processes. But the individual buildings that comprise a major part of the airport infrastructure are often not, on their own, the critical elements that determine the longer term sustainability of the site.

An in-depth study has been carried to define an airport-wide sustainability index. The study has been focused on the concept of airport environmental capacity[1] and the good/best practices complying with sustainability indicators already adopted during the planning, construction, management, maintenance and decommission of European and international airports.

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The research will define specific method and tools enabling both design project control and sustainability appraisal. The method will be based on systematic process, linked to modeling studies and the development of sustainability indicators that would inform a site wide approach to the design of airport infrastructure. The proposed method and tools will also create new opportunities for aviation regulatory organizations and airport managers to define strategies and anticipate decisions to enhance sustainable airport infrastructure design.

Keywords
Project Design Management, Integrated Approach, Sustainability Index, Green Airport Design, Environmental Capacity Evaluation

Airport Infrastructure constraints to growth

Airports are critical nodes in the transport system and can have a vital role in supporting the socio-economic development of city regions. The structure and organization of the transport systems have determined the evolution and changes of human settlements in each age, influencing the creation of public spaces designed to accommodate nodes and connections (Button et al., 1995; Trinder, 2001; Woudsma & Jensen, 2003). Airports have the ability to re-model the location of economic activities and urban development (Department for Transport (DfT), 2004; Knippenberger & Wall, 2010; Blonigen & Cristea, 2012). Therefore strategies for the development of air transport must be considered a priority, integrating them in the context of broader strategies for economic development and the infrastructure of the country.

Europe faces a particular challenge in respect of its airport infrastructure because of limited capacity that prevents aviation responding to demand when and where it arises and the difficulty of securing planning approval for new airport infrastructure development (ACARE[2] , 2008). This is due to the dense urbanisation of the continent, the complex system of rules and planning regulations that have arisen as a result and opposition from local residents and their politicians to airport growth. Airport operations are not only limited by their infrastructure. Airports can be constrained by environmental issues which restrict current operations and limit future growth potential.

This has given rise to the concept of airport environmental capacity (Coleman, 1999; Upham et al., 2003; Thomas, 2013). It is evident that the debate on the subject is not only focused on the noise and air quality impacts on the areas surrounding the airport, but has expanded the focus on the effect that airport and aviation activities have on climate change through carbon emissions (EEA[3] , 2007, 2012; Thomas et al., 2010; NATS[4] , 2011; DEFRA[5] , 2012; Eurocontrol, 2013).

The European Commission communication COM (2011) 823 EU "Airport policy in the European Union - addressing capacity and quality to promote growth, connectivity and sustainable mobility", confronts this problem by proposing a European regulation scheme that could address three challenges, namely capacity, service quality and environment, through improving technologies, efficient operations and infrastructure design. Sustainable development at an airport concerns developing an infrastructure that facilitates the long term growth of the site so that the airport can continue to respond to demand when it arises. The conventional capacity of an airport is considered in terms of its infrastructure capacity (runways, taxiways, terminal, etc.) and how well that is managed. It is becoming increasingly clear however, that the operational capacity of an airport and its ability to grow (i.e. obtain planning approval for growth) is increasingly linked to the environmental impacts of its operations.

Principles of sustainable airport infrastructure development

A wide range of impacts on local communities and the natural environment can constrain the operation of airports and restrict their ability to secure planning approval for future growth (Upham et al., 2003; Thomas, 2004). Airport infrastructure growth depends on the assessment of those issues and the opportunity to strategically and systematically manage them during the design process. Even though the operational capacity strictly depends on infrastructure factors – such as requisite airspace, number of runways, extent of taxiway and apron development, number and size of terminals and landside facilities and the ease of access – a number of environmental constraints may prevent their potential traffic growth and future development (Thomas et al., 2010; Thomas & Hooper in Ashford, 2011; Thomas, 2013). Environmental impacts are associated with the operations of the airport and the specific conditions and characteristics that pertain the area in which the airport is located – proximity to the houses, other polluting

sources and industries, water supplies, energy resources and materials availability, climate changing conditions, sensitive habitats and others. They are even more critical when additional airport infrastructure has to be provided in order to maintain the operational efficiency related to the increasing air traffic demand (Thomas et al., 2004).

The European Commission explicitly notes that 'the development of transport systems must not be at the expense of the quality of life of citizens or the destruction of the environment. The indefinite continuation of current trends in transport in certain modes (road, air) would be unsustainable in relation to its environmental impact, in particular as regard climate change' (European Commission, 1998). This single definition of sustainable development needs to be implemented on the basis of specific social and economic conditions related to the different situations (e.g. regional and local policies, urban configuration, etc.). As a result, even if there is a general definition of this concept, this must be "translated" and adapted for every single piece of infrastructure, evaluating the magnitude of social, economic and environmental concerns, in order to define the specific conditions that impact upon sustainable development. Defining and indicating sustainability will always depend on the definition of all these interrelated aspects.

Developing Green Airport Design Evaluation (GrADE)'s method and tools

The development of sustainable airport infrastructure depends on achieving correct balance between social and economic objectives within the limits imposed by the environment (Upham et al., 2003). The integration of these concepts implies the definition of what are the environmental constraints to airport development and how this is affected by the design of infrastructure and its configuration, and technological, operational and business features. Therefore, environmental and operational capacity can be maximised through a long-term planning ensuring an effective environmental management that compensates for growth through the introduction of eco-efficient infrastructure, technological, and operating strategies (Thomas et al., 2001).

The research proposed in this paper investigates the issues concerning the project design management and the way in which

the design process affects airport terminal quality both on the environmental and technological sides (Esposito, 2010). Literature shows how acting on organizational models which emphasize the principles of collaborative process among all stakeholders, the added value derived from the integration of all the contributions is clear (Brown, 2001; Emmitt & Gorse, 2003; Dainty et al., 2006; Esposito, 2007; Rizal, 2007; Carrara et al., 2009; Kleinschmidt et al., 2010). The research for project design management and sustainability evaluation has a direct impact on the design process itself, influencing the way the product development is made, better focusing on aspects of project information integration. This matter falls within the scope of the *Framework Horizon 2020*[6] initiative, which has as main objective to bridge the gap between research, various industrial sectors and the market supporting the development of technologies and processes that have resulted in products of commercial interest toward sustainability (European Commission, 2014).

Green building assessment models

A number of tools using sustainability indicators have been developed in the last two decades. International Green Building rating systems such as LEED (Leadership in Energy and Environmental Design), BREEAM (Building Research Establishment Environmental Assessment Method), CASBEE (Comprehensive Assessment System for Built Environment Efficiency), GBTool (Green Building Tool), Protocollo ITACA (Istituto per l'Innovazione e Trasparenza degli Appalti e la Compatibilità Ambientale), and others have been used as an effective framework for assessing building environmental performance and integrating sustainable development into building and construction processes (Cole, 2003; Forsberg & von Malmborg, 2004; Ding, 2008; Haapio & Viitaniemi, 2008; Reed et al., 2009; Robichaud & Anantatmula, 2011; Berardi, 2012). These models, which initially represented only a tool for analysis and recognition of the environmental performance of green buildings, today are evolving into systems that combine the certification objective with that of the real performance management during the design process, providing a structured platform for the definition of the "green" project requirements and the performance measures to guide the sustainable design (AlWaer et al., 2007; Ali & Al Nsairat, 2009; Malmqvist et al., 2011). But these programmes have focused in particular upon the design of the individual building and does not consider the whole system of constraints and impacts

which specifically affects the airport development as an integrated infrastructure. Evidence suggests that in terms of sustaining the future growth and development of an airport, environmental impacts that give rise to capacity constraints and refusal of planning approval are not those associated with the energy efficiency of buildings, but rather other environmental impacts associated with the airports operation such as the disturbance caused to local residents from aircraft noise, local air quality, that is adversely affected by air and ground transport traffic etc. Therefore the research aims to define a set of sustainability indicators related to the airport design, providing infrastructural and technological solutions for minimising the environmental impacts.

Airport sustainability appraisal

Airport capacity and performance objectives and plans to achieve service level targets are not simply limited to the problems of air traffic, but also cover the ground infrastructure and the airport layout plan. The design of the airport - as infrastructure consisting of multiple functional spaces and facilities and integrated with the surrounding territory (accessibility, business investment, social return, etc.) - requires many levels of analysis and assessment to evaluate the development constraints and the impacts on the environment at different scales, in function of traffic capacity. Working in this way means that long-term planning of airport areas has to take into account environmental and social constraints (e.g. legal, community, lack of resources, etc.) and the relationship with the urban functions set up in proximity of airport areas.

Climate change, regulations and resource constraint, environmental impacts and the improving of passengers flows and changing safety requirements, increasingly demand systemic changes in the definition of the design process and of the green building requirements to comply. Strategies to make airports environmentally sustainable and climate resilient should include design methods and tools, allowing a proper design process focused on the analysis, evaluation and management of all the airport infrastructure environmental constraints. Designers have also to deal with impacts on urban planning, business costs and revenues, new financial opportunities, increased security challenges. The balance between environmental, social and economic evaluation criteria represent the core of a sustainable development.

The development of a sustainable airport - that can continue to grow in response to the arising air transport demand - requires an

architectural approach that encompasses not simply the whole airport site, but includes the wider infrastructure into which that airport is embedded. Rating systems - in order to be efficiently used in the airport infrastructure design - need to be improved through the development of methods and tools that will enable the life cycle planning incorporating considerations about the whole infrastructure as it relates to the transport demand, to its social impact – both on the passengers and the surrounding community – and the environmental constraints. All these aspects must be considered since early stage of the design process and properly evaluated in order to inform an integrated and balanced system of architectural and engineering solutions. A new airport rating system could be promoted in planning policies, harmonizing the process of growth and urban transformation with the development of the airport, which should not be considered as an isolated and autonomous entity.

Methodology

In order to achieve the proposed objectives, an initial phase of analysis and study has been carried out concerning the airport project design process and the state of the art of regulations, standards and operational and project strategies related to the green building design and the aviation industry. The analysis has been carried on through the scientific literature review and the study of international research results concerning in particular the development of sustainability rating systems.

Literature and web review has focused on methods to define, analyse and assess the concept of environmental capacity and sustainable airport development through in-depth study of the impacts arising from airport operations and infrastructure designed to:

- Identify the impacts related to the airport infrastructure development and operation;
- Define how they can act as a constraint to airport growth;
- Indicate methods for assessing their magnitude, forecasting, and monitoring those impacts;
- Examine the infrastructural design, technological, operational and business practices required to minimize those impacts.

In-depth study has been carried to define the airport-wide sustainability index. The study has been focused on the concept of airport environmental capacity: a list of "green airports" case studies

has been selected in order to identify methods, tools and best practices complying with sustainability indicators already adopted during the planning, construction, management, maintenance and decommission of European and international airports which include a sustainable vision within their development plans.

A second phase of analysis of the selected case studies is currently going on through interviews, workshops, focus groups and semi-structured questionnaires, in collaboration with the TxP Research group (Dipartimento di Architettura, Università di Firenze, Italy), the Centre for Aviation, Transport and the Environment (School of Science and the Environment, Manchester Metropolitan University, UK), academics, researchers, architects and airport design experts and Airport Industry authorities such as the Italian National Civil Authority (ENAC, Ente Nazionale Aviazione Civile), Eurocontrol and the ACI (Airport Council International).

The research is also enhanced by the proposal of a training module within the Laboratorio di Progettazione Ambientale (Environmental Design) in the Architecture Master Degree Programme at the Dipartimento di Architettura, Università degli Studi di Firenze. Students are asked to deal with the environmental issues related to the airport infrastructure using tools and methods developed through the doctoral research, providing the opportunity to evaluate their effectiveness in supporting the project design process and evaluate the most effective strategies for minimising airport impacts and improving design and technological performances.

Beyond the specific objectives of the research, these activities have raised awareness of the role of the researcher to create a dialogue between different disciplines and collaboration within experts from various fields in order to increase his/her expertise and - at a broader level - of the architect/technologist as effective interface between operators, stakeholders and experts involved in the project design process of airport infrastructure.

Expected results and research recipients

The result of this study is the application of sustainability criteria in airport design through the support of innovative operational tools. The research will define specific method and tools enabling both design

project control and sustainability appraisal. The method will be based on systematic process, linked to modeling studies and the development of sustainability indicators that would inform a site wide and Life cycle approach to the design of airport infrastructure. This type of project design organization enables the management of the sustainability requirements and it also ensures the consistent verification of all project levels of development, from the project conception to the construction and operation and maintenance.

The Green Airport Evaluation Design method and tools will contribute in achieving the goal of sustainable development of airport infrastructure providing a methodological framework to measure and monitor environmental performance and creating new opportunities for the aviation regulatory organisations and airport managers to define strategies and anticipate decisions to enhance sustainable airport infrastructure design.

Future developments

In order to achieve higher levels of sustainability the proposed method and tools represent a good practice for the airport system which is always open to revisions and implementations imposed by the continuous increase of passengers flows, development of technology, updating of standards and evolution of the sustainability design approach itself (Zografos and Madas, 2006). The next step is the integration between the decision-making and design process in the airport field already green aimed and BIM (Building Information Modelling) simulation emerging in the international panorama. Possible future developments of the research are then aimed at the elaboration of green performance specifications integrated with Building Information Modeling & Management (BIM(M)) suitable for the airport industry (Whyte, 2012).

Notes

1. The operational capacity of an airport can be constrained to below its infrastructure capacity if the environmental consequences of its operation exceed environmental regulatory limits, public acceptability or the airport is unable to secure adequate supplies of resources to meet customer service requirements.
2. Advisory Council for Aviation Research in Europe

3. European Environment Agency
4. National Air Traffic Services
5. Department for Environment, Food and Rural Affairs
6. Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. Seen as a means to drive economic growth and create jobs, Horizon 2020 has the political backing of Europe's leaders and the Members of the European Parliament. They agreed that research is an investment in our future and so put it at the heart of the EU's blueprint for smart, sustainable and inclusive growth and jobs (www.ec.europa.eu).

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Halfway housing for inmates
Typological alternatives to traditional prison

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Abstract

This research addresses the issue of prison architecture, specifically it talks about minimum security institution. The aim is to identify new design criteria and to develop alternative architectural proposals.

The expansion of prison population in the last 20 years led many governments to produce guidelines and reference standard to ensure uniform treatment and shared levels of comfort. The awareness reached by every Western nation that the goal of punishment is to re-integrate inmates into society, raised the need to understand deeply the detention effects on people and to understand how prison design can influence the behaviour and the life of the users (inmates, staff and visitors).

The research focuses on minimum security institution (or open house) to elaborate new organizational and functional principles through the analysis of functional areas and to develop a meta-design that identify dimensional, environmental and technological requirements indispensable for design. The purpose of the research is to define alternatives architectural types of prison that reflects the needs of the inmates, in which the residential and rehabilitation functions predominate on classic organization of traditional prison.

Given the huge complexity of the variables which must be taken into account in the design of prison, this research aim to identify the key design factors, such as: location, dimension, overall layout, control's activities, type of living accommodation and, last but not least, the quality of the space both inside and outside. The identified key design factors will be synthesized in several architectural design proposals with the goal to resolve the relationship between functional layout and building typology, or rather the relationship between functional patterns and the space configuration, and furthermore the relation between building typology and the urban spaces or the urban facilities that surround the prison.

The achievement of the goals of quality, livability and safety of such facilities represent the aim towards which the research want to arrive for

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codify a set of 'principles and rules' useful for effective design of the new prison model. Also the aim is to understand the space's characters and the nature of activities to define new design criteria and to steer future policy choices about building prison to simplify the management and maintenance procedures and to avoid unnecessary costs.

Keywords
Penitentiary Building, Minimum Security, Collective Housing, Responsibilization-based Penitentiary Treatment.

Introduction

The inadequacy of Italian correctional facilities, exacerbated by increasing overcrowding , has reached such critical levels in recent years that Italy was condemned for inhuman and degrading treatment of prisoners. If the issue of overcrowding mainly concerns the legal system and State laws, the issue of inadequate prison space undoubtedly has to do with the architecture and planning of new facilities. As demonstrated by European statistics, there is a decrease in the re-offending rate in States where inmates have the possibility of working and living in detention facilities that provide adequate comfort levels and respect for human dignity. Austria, Spain, Denmark and Norway have adopted penitentiary treatments based on the principle of responsibilization in specially designed facilities , in which inmates have the opportunity to express themselves, to take on responsibilities by getting involved in activities offered by the detention center and, within certain limits, to organize their time. In order to introduce the responsibilization-based penitentiary treatment even in Italian correctional facilities it is necessary to adapt the building typologies currently in use to the new criteria for prison treatment, and therefore develop new architectural alternatives in which the residential and collective nature of the structure prevails on traditional typologies. To plan new facilities according to the "residential" criterion means to consider prisons as a collective house, similarly to a hospital, a convent, a residential home for the elderly, or a reception center. Inside, all of these structures present increasing degrees of permeability and accessibility to the various areas, as well as differentiated levels of privacy and security. The space with the highest degree of privacy and independence is the living area, that is, the residential unit. The purpose of organizing such a structure in units is "the creation of a space that can be regarded as a 'house', in which the

private area with bedrooms and bathrooms on one side, and the more public space comprising the unit's facilities on the other, can be viewed as the "living area" and the "sleeping area" within the same residence. Inside said units it is possible to identify a gradual progression of spaces, from private to semi-private, that can simultaneously guarantee both privacy requirements and socialization requirements, drawing on the family environment example" (Di Giulio, Terpolilli, 2002, p.74). As demonstrated by a number of European experiences, structuring a prison according to the residential unit arrangement has the effect of decreasing stress levels associated with incarceration, while increasing the effectiveness of the re-education treatment and of reintegration into society.

Consequently, the work herein described will focus on the definition of organizational-functional criteria for open detention facilities through the analysis of the relevant functional areas and unit spaces, as well as by determining the key factors that influence the design of penitentiary facilities, with the intention of reviewing and updating them in view of specific considerations concerning typology and organization.

Purpose and objectives of the research

The purpose of this research is two-fold: the first one is to further deepen the study of the architectural typologies relating to open detention facilities, in order to fill a gap in the architectural discipline and to respond to the evolving needs of the prison system with regard to the classification of inmates held in differentiated penitentiary systems . The second aim is to define the typological characteristics, the functions, the users and finally the functional organization of open detention facilities so as to rationalize building and management costs, as well as to optimize the quality level of the service provided.

By way of the methodology described herein, we intend to finally identify a basic organizational project that allows to contextualize - within an architectural plan - the usual, daily activities performed inside a prison. Firstly, the objective consists in defining the general design criteria and in drafting a meta-plan that establishes all the dimensional, environmental and technological requirements needed to design new facilities, or rather to refurbish existing buildings that are likely to be converted on the basis of shared typologies. Secondly, the objective is to describe, through the use of illustrative planning solutions, the

possible aggregations of the various functional areas identified.

The prison project: a reflection on some key factors

In order to define the general design criteria for minimum security level housing, the first step was to identify the key factors relating to the organization, management and morphology of prison structures. Subsequently, the factors identified were reevaluated on the basis of a number of considerations pertaining to typology, function and organization. The key factors constituting the foundation of the general design criteria are:

1	Tipology	→	Typology similaritieswith collective housing
2	General layout	→	Definition of functional zones
3	Aggregation of parts	→	"Island" arrangement
4	Arrangement of living areas	→	Layout of the living areas

Typology similarities with collective housing

The first aspect that needs consideration when reassessing prison typology, as currently standardized today, is the development of an analogy process linking prison typology to collective housing. There are several examples of collective residences in the history of architecture: monasteries, hospitals, residential homes for the elderly, student housing, etc. The most interesting architectural structure for the purpose of this research is represented by the monastery, and in particular, by the structure of the Carthusian monastery (*Certosa*). From a perspective of functional organization, the Carthusian monastery model is the best at combining the level of individual life with the requirements of community life. This particularity is due to the presence of various different "spatial contexts" (three in particular), each with its own predominant function and each characterized by a specific level of autonomy and privacy. The spatial contexts that compose a Carthusian monastery are three: the first one groups together all service areas and represents the place of interaction with the outside world; the second one includes all areas intended for community life (church, sacristy, refectory, etc.) and constitutes the connection between the

primarily private space occupied by hermit monks, and the slightly more open one used for trade with the outside world; the third one is composed of the living areas used by hermits (i.e. cells arranged around the cloister) and represents the main area where the monks conduct their life of isolation. The presence within the prison structure of a similar functional arrangement (balance between individual and community life, need to interact with the external world, gradual levels of permeability) makes it possible to adapt the Carthusian monastery organization to a prison structure without upending the founding principles, with the difference that the second spatial context (the one pertaining to community life) takes on a greater import in prison, given it must ensure that a wide array of activities - educational, occupational, cultural, religious - are carried out.

Definition of functional zones

A reassessment of the traditional organizational-functional models is the second aspect that needs to be considered to ensure that prison architecture effectively contributes to the positive implementation of prison treatment. Given that the current configurations, with regard to typology and distribution, are exclusively based on criteria of safety and surveillance, the purpose of this research is to encourage experimentation with those architectural typologies that instead, on one hand, promote conditions capable of recreating a setting in which spaces feel livable and usable just like in a domestic environment, and, on the other, represent a rationalization of the functional and management organization of services (Di Giulio, Terpolilli, 2002, p.72). The need to rationalize may indeed be satisfied using a "functional zones" arrangement (figure 1): each zone features specific levels of openness/closure, autonomy/dependence and multi-functionality/single-functionality, depending on the activities and on the various types of users it accommodates.

The "zones" arrangement allows to gradually pass from community spaces, in which the administrative, educational, occupational and cultural functions are performed, to the more private spaces, which instead comprise the housing areas, inclusive of the living area, the sleeping area and all necessary unit facilities.

Fig. 1 Schematic example of functional zones arrangement [author]

The differentiation of permeability levels between the various functional zones carries three significant benefits:

1. It provides detainees with the possibility of moving freely within certain functional areas, thus expanding their range of action and limiting the confinement effect typically connected with imprisonment;
2. It adapts the organizational models and distribution features to the profound differences that lie between the various functional areas in view of the activities and users that characterize them;
3. It increases the efficiency of security personnel by collocating strategically positioned filter areas, so that staff may be employed for more qualifying and productive tasks compared to detention.

A different degree of accessibility is assigned to each functional zone in consideration of the functional areas it identifies. For example, category A, which presents a lower degree of accessibility (higher degree of privacy), will be accessible only to specific types of users, while category D, which is more open, may be used by all of them (with the exception of inmates). The four functional zones identified in such a way may in turn be organized in three different groups (figure 2).

Fig. 2. The three groups of spaces are organized according to the respective degrees of accessibility of the functional zones [author]

It is useful to point out that such classifications and subdivisions do not possess any real practical value yet, and cannot exactly be transferred to project level; still, they are helpful, as they provide some conceptual indication of the spatial configuration and of the functional organization, hence anticipating a variety of architectural solutions. Consequently, they can be regarded as indications for a meta-plan.

"Island" arrangement

During the last 20 years, several different strategies have been developed allowing inmates to expand their range of action and, therefore, releasing the guards from the duty to accompany each prisoner to their respective space during the course of the day. The arrangement that better combines the need for free movement with the previously described organizational structure is the one that provides for an "island" arrangement of the prison, figure 3.

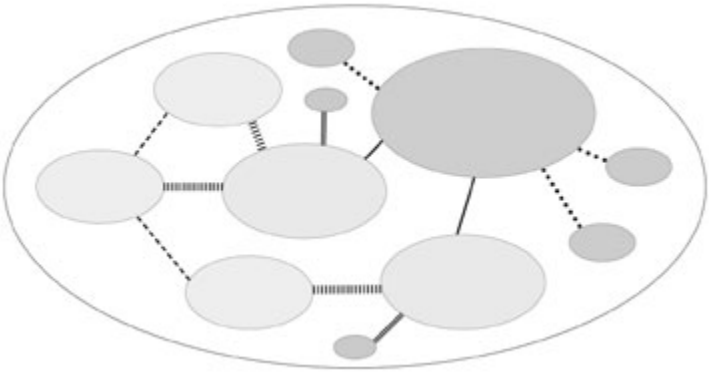

Fig. 3 Schematic example of the "islands" arrangement, with the different types of connections [author]

The "island" arrangement requires that the main functional areas (residential area, visitor and interview area, community facilities, etc.), which are grouped together according to the above said principles, possess such a 'degree of inner circulation' that inmates are allowed to move without necessarily having to be accompanied. Each 'island' has a dedicated area for prison guards: in this type of arrangement surveillance can be performed directly (direct supervision). With direct supervision, instead of performing surveillance from a single viewpoint, guards move freely among inmates, thus encouraging the creation of positive relationships aimed at consolidating the active role played by the agents in the inmates' re-education process. In addition, the 'island arrangement' makes it possible to differentiate accessibility for different categories of users, figure 4, and to associate a specific level of accessibility with each typology of user (programmed accessibility, global accessibility, partial accessibility and definite accessibility).

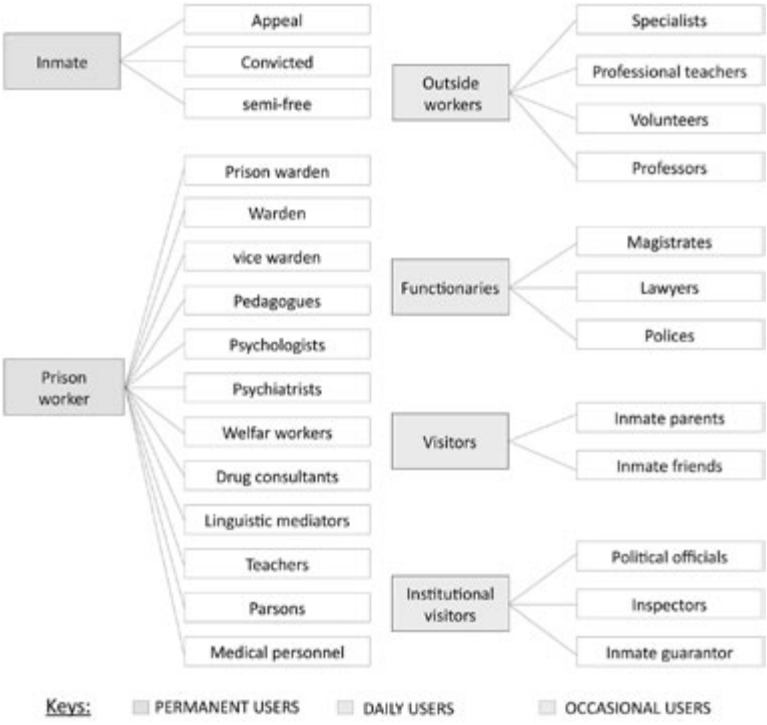

Fig. 4 Example of classification of users into categories [author]

From an architectural point of view, the choice of organizing prison spaces in islands affords greater planning freedom, the possibility of separating the various categories of inmates more easily by using specific housing arrangements , as well as to create a different relationship - both internal and external – with respect to living areas and community areas alike (sitting rooms, dining halls etc.)

Layout of the living areas

One of the most innovative planning principles concerns going from the detention block (used in current typologies) to the residential unit, figure 5. Usually, the detention block is composed of rooms for overnight accommodation (cells), toilets, and in some

cases, of a - generally inadequate – association area. The residential unit arrangement, instead, aims at creating an area that conceptually reproduces the domestic environment of a house, somewhat imitating the same gradual progression from "private" to "semi-private" spaces. Due to the presence of areas that are diversified as differently equipped for intimacy, conversation and recreational activities, the spaces within the unit provide inmates with the opportunity to choose between seclusion and association, individual activities and social activities, communication and isolation (Di Giulio, Terpolilli, 2002). Near each bedroom there are other rooms, such as living rooms, sitting rooms, teaching spaces and meeting areas that support the development of personal relationships among the detainees, who are encouraged to express their personality. The domestic character of the unit is ensured not only by the spatial arrangement, but also by the presence of small groups of inmates . Statistics on violent episodes show there is a decrease in stress levels caused by forced cohabitation when the number of cohabiting inmates decreases, specifically because of the possibility of cultivating interpersonal bonds, which in turn helps to reduce the sense of alienation and disorientation due to very big groups. Besides reproducing the domestic and family environment, the residential unit arrangement aims at helping inmates develop the most positive outlook possible with regard to their personal detention experience, which is an indispensable element in support of social rehabilitation.

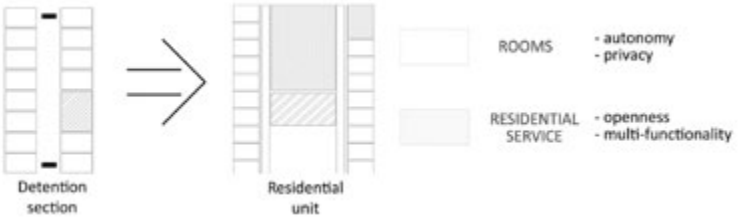

Fig. 5 From traditional custodial section (left) to the new residential unit (right), with rooms organized around the area of relationship [author]

Conclusions

Just as the considerations herein above sought to explain, the concurring factors in the definition of an efficient and civilized prison environment are many and varied, and they require further investigation

and multidisciplinary research. In this sense, the contemporary architectural culture must become aware of the complexity of prison structures, in order to fully comprehend the connections that tie spatial organization to psychological, perceptive and behavioral aspects. As the few studies carried out so far have confirmed, the difficulty of establishing conclusive results with regard to the key factors that positively influence the prison environment depends, on one hand, on the extreme complexity of the penitentiary system and, on the other, on the conflicting cultural stances that sometimes hamper the change and innovation process that research in this field could instead promote. The vast economic resources that prison administrations worldwide spend to keep the prison building system going could be reduced by designing prisons that are more efficient from the perspective of quality of service and of the safeguard of inmates' rights, as well as of those of prison operators and external users.

Notes

1. The total number of inmates in Italy is approximately 54.000 individuals against a prescribed capacity for the entire Italian national territory of 49.000 beds. Figures as of 30 September 2014, source: Department of Justice. Said outcome is the result of the government's great commitment in recent months due to the ongoing emergency situation in penal institutions, mainly caused by overcrowding, which peaked to 146% in 2012.
2. Ruling by the European Court in Strasbourg, Sulijmanovic vs. Italy: 16-7-09
3. The re-offending rate in Italy is close to 68%; in countries where inmates are guaranteed a job it reaches 19%. (Source: Associazione Antigone).
4. References to responsibilizing detention can be found in the essay by Mauro Palma, "Due modelli a confronto: il carcere responsabilizzante e il carcere paternalista" included in the volume "Il corpo e lo spazio della pena. Architettura, urbanistica e politiche penitenziarie" edited by Stefano Anastasia, Franco Corleone, Luca Zevi.
5. Among the newly conceived detention institutions, we'd like to point out: Justizzentrum in Leoben, Austria; Halden Prison, Norway; Bastoy Prison, Norway; East Jutland State Prison, Denmark.

6. The typologies currently in use in Italy are the following: typology with differentiated building units, compact kind and telegraph pole kind. For further details, please refer to Scarcella L,. Di Croce D. (1997), Repertorio del patrimonio edilizio penitenziario in Italia al 1997, Ministero Grazia e Giustizia.
7. The open detention regime "must be used for individuals of limited dangerousness by gradually overcoming the criteria that delimits detention within the space of their overnight accommodation. In this sense, the detention perimeter must be extended at least to the boundaries of the block, that is, whenever possible including also its external open areas, thus complying with the guidelines of the penitentiary system. Within the new perimeter a new kind of detention can be conceived, one that is characterized by the freedom to move in compliance with specific rules of conduct that regulate its practice (Circular letter of the Prison Administration Department, 25 November 2011, "Procedures for sentence execution. A new treatment model that includes safety, acceptance and re-education".
8. Refer to ft.7
9. In its complexity, the building layout typical of Carthusian monasteries manages to combine different typologies of space, progressively decreasing the degree of isolation from the outside world: "In the panorama of Carthusian charterhouses it is possible to distinguish three basic structural units. The units lived by the hermit, by the coenobium and by the converted, each one organized around its own cloister, are distributed according to the idea of a gradual detachment from the outside world and that increasingly serves as a diaphragm, protecting the monks' isolation" (M.A:Giusti, 1988, quoted by Terpolilli, 2012).
10. "These three levels of space, from a typological and functional point of view, are the three levels that every structure should have in order to achieve, at any moment, that condition of coexistence between individual life and community habitat" (Terpolilli, 2012, p.68).
11. The traditional organizational-functional prison arrangement is made up of two elements: 1) an area beyond the surrounding wall perimeter, which contains the administration, the barracks and the offices; 2) an area within the surrounding wall

perimeter, which instead contains the living areas (blocks), the visitor rooms and the areas used for recreational activities. All blocks are generally structured according to a triple or quintuple distributive system (room-hall-room; room-hall-facilities-hall-room), and they are normally arranged in a "T" or "L" shape around a single observation point (principle of radial surveillance), thus allowing a limited number of guards to be able to visually check all blocks at one time.

12. The "island" arrangement has been successfully tested in the prison of Halden (Norway) and of East Jutland State Prison (Denmark).
13. The expression "degree of inner circulation" indicates the capacity of users to freely enjoy and use the space as a result of the absence of containment measures (railings, armored doors, bars).
14. Prisons that employ direct supervision are generally known as 'new generation prisons' and are the result of research conducted in the United States by the Federal Bureau of prison: "Direct supervision prisons have a much larger central association area surrounded by only one or two storeys of cells. The central space is usually triangular or rectangular, and officers roam and mingle there with the inmates. Greater staff-inmate contact has been found to lead to increased positive relationship, allowing more effective surveillance and better security" (Fairweather, 2000, p.35)
15. With regard to living areas, a number of aggregation methods are possible, as the range of worldwide experimental typologies currently used in prisons demonstrates, such as: single rooms, double rooms, small residential units (from 3 to 6 people), open dormitories, segmented dormitories, 'safe' cells. Studies confirmed that a reduction, or the absolute deprivation, of privacy produced by certain aggregations leads to high tension situations and to violent episodes between inmates.
16. Research conducted in the United States concerning the optimal number, if such a definition is possible, of inmates inside a living area fluctuates between 10-15 people. Certainly studies on density and proxemics provide a useful resource for the architectural investigation of new possible solutions.
17. "The design of the prison environment is crucial to its operation and to the impact it has on the achievement of

correctional goals for inmates, staff and public users. However, the physical environment cannot guarantee or ensure the achievement of those goals. It can only work in conjunction with the administration, staffing, operations and activities, and with community support, to help the prison become an effective institution serving society's ends" (Fairweather, 2000, page 48).

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TERPOLILLI C. (2012) Progettando edifici – Considerazioni sul progetto di architettura come arte

Comparison of methodologies: creativity to develop design projects

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Abstract

The purpose of this study is to determine the methodologies used by researchers and design students, particularly in the creativity phase to develop design projects in various sectors, visual design and product design. These methodologies have been compared with regard to their order, position and number of pre-operative and post-operative phases of creativity levels to see which are the most cited and if, indeed, they are effective in the success to reach the objectives sought by the authors. Ten scientific papers in the creative and innovative design sectors were reviewed in the period from 2009 to 2014. The papers were published in journals, with Qualis A and thesis university studies in the area of design. For each paper, intellectual production was classified as: (i) number of phases, (ii) order of creativity phases, (iii) number of steps before and after the creative phase, (iv) the composition of the creativity phase, (v) total number of elements which make up the creativity phase, highlighting the similarities and differences of this creative phase. The acquired data are from publications made in Brazil and Italy. The evaluation is useful for updating information on existing methodologies in the field of design, while providing the scientific and professional community project grants to choose the most appropriate method for each type of work to be developed. All this helps make room for new creative ideas and, thereby, increases the range of methodological choices for data collection and the development of projects. An increase of creative solutions contributes to innovation and the economic growth of countries. Therefore, it is important to constantly improve existing methodologies. According to Munari (1997), methodology is important for the realization of design projects and its use contributes, at the same time, to flexibility in new ways of thinking.

Keywords

Design, Creativity, Innovation, Methodology, Tools

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Introduction

According to Sven (2002) the survival and the success of a company, particularly in the long run, depends on creativity. Simonton (2012) claims that creativity involves active people in a dynamic and interactive process which brings forth innovative products (material and/or non-material). Studies on creativity are important even for economic development, as stated by De Matteis (2013) and Moroni (2013). In light of this, we can say, quoting Ramos (2006), that "educating for creativity is essential." Creativity is a factor for innovators. According to Eguchi and Pinheiro (2008) the basis of design is innovation because of the use of creative methodology. It is important to remember that the word ¨project¨ comes from the Latin "proyectus", meaning "a forward throwing action".

Bonsiepe (1984) and Munari (1997) speak of the importance of using methodology. However, according to Munari's study (1997), not everyone describes the process of their own work, a secret that cannot be revealed. It was therefore decided to examine the methodologies that are applied to the study of design. Studies on the topic of methodologies comparison have already been published, but only as structure models to categorize design methodologies, as seen in Bonsiepe's study (1984), updated by the author himself in 1995 for Bomfim, then for Ximenes&Neves (2008) and more recently in Vasconcelos' thesis (2009). Still it has not been done with a focus on the creative phase. This work stands as a study of this process in every methodology.

Purpose and Objectives of the Reaserch

The objective of this work is to determine which methodologies are used by design researchers and students, particularly in the creative phase, to develop projects of design and thus, to confront them considering the order, the position and the number of steps before and after the creative phase itself, in order to verify the most recurring ones, and if, in fact, these are actually effective for the achievement of the objectives pursued by the authors. The analysis has been made through dissertations and doctoral research from the scientific periodical Qualis A.

Methodology

Vasconcelos (2009), after analyzing the concept of design methodology given by the authors Alexander (1964), Bomfim (1995), Bürdek (2006), Cross (1993), Löbach (2001), Roozenburg (1996),

concludes, in general, that Design Methodology can be seen as an outlined process based on distinct steps, with the purpose of improving and helping the Designer (or their Teams) develop or conceive solutions for a specific problem through an artifact (namely a good or a service), providing a range of methods, techniques or tools. In Munari's opinion (1997) the design method is much more than a series of necessary operations in logical order, dictated by experience. His goal is to achieve the best results with the least amount of effort. Bonsiepe (1984) has engaged in studies about methodologies comparison, albeit not focusing on the creative process. For this reason we went back to analyze the same methodology by several authors as Vasconcellos had done, with the aim of enriching the theme of methodology, specifically the creative phase.

First of all we analyze the study on the methodology by Gui Bonsiepe. He compares four groups according to their linearity, the presence of feedback, the circularity and the flexibility between phases. A study that he based on the works of these authors; (i) Archer, (ii) Burdek, (iii) Borzac and VID, and then the methodologies found by Baxter, Brown, Munari and Löbach in the scientific journal Qualis A.

Leonard Bruce ARCHER's Method.

Linear Method of the Process by author Leonard Bruce Archer with the title of "A systematic Method for Designer"

This method is descriptive, linear, as seen in Figures 2 and 3, and consists of the following steps:

1- Problem to solve > 2- Preparation of a Program > 3- Data Collection > 4- Analysis > 5- Summary > 6- Development > 7- Communication

Fig. 1 Linear Method by Archer.[Bonsiepe, 1984]

The author explains each of the seven stages as follows:

Phase 1,"Problem".

Phase 2, "Suggestion for a work program", in which to determine the critical points and to suggest a range of actions.

Phase 3, "Data Collection", is to receive, gather, classify and organize pieces of information.

Phase 4 "Analysis" is used to identify and analyze the sub-problems and prepare them for a better specialization of the performance.

Phase 5, "Synthesis", consists of the instructions reception and the solution to the remaining problems, solutions development, general definition of the solutions.

Phase 6, "Development", is the evaluation of the hypothesis.

Phase 7, "Communication", defines the requirements for communication, the selection of the means of communication, the preparation of the submission.

Fig. 2 Linear Method by Archer.[Bonsiepe, 1984]

Bernhard BÜRDEK's Method.

This method is descriptive, with feedback, as seen in Figures 3 and 4, and consists of the following steps:

Problem > Analysis of the Current Situation > Problem Description > Concept, Generation of Alternatives > Evaluation and Selection > Processing

This is a non-linear methodology because every phase contemplates the recurrence of data verification. There is freedom of movement in the development of design projects, as can be seen in Figure 3.

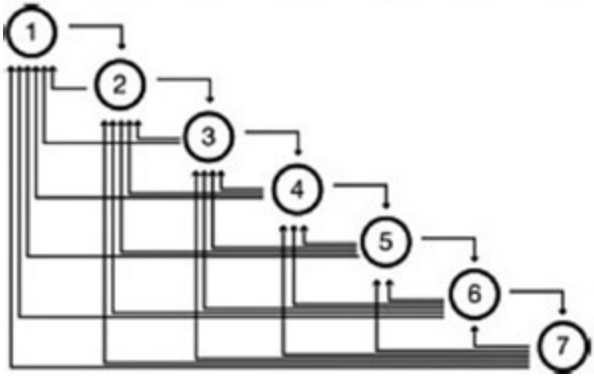

Fig. 3 Non-linear Method by Bürdek.[Bonsiepe, 1984]

In Figure 4, the seven phases of the method proposed by the author Bürdek.

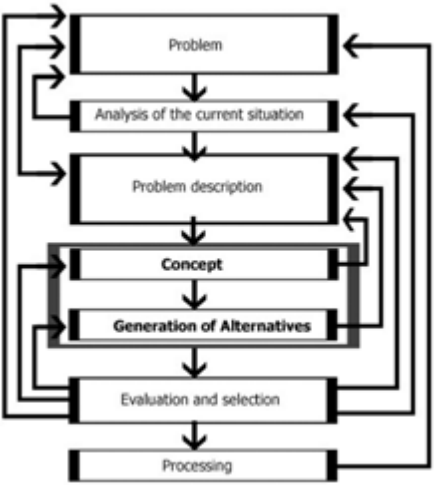

Fig. 4 Non-linear Method by Bürdek.[Bonsiepe, 1984]

Bob BORZAK's Method.

This method is descriptive, the shape of a circle, as seen in Figures 5 e 6, and consists of the following steps:

1- Abstract > 2- Defining objectives > 3- Study of the Implementation> 4- Design sketch > Actual Design with Details 5-> 6- Production Plan – Production > 7 Concrete (feasible)

In Figure 6 the shape of a circle can be seen. Since it is repeated, the author calls it "cycle", circular method.

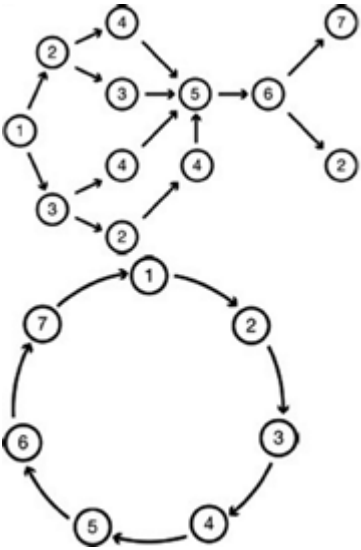

Fig. 5 Circle-shaped Method by Borzak.[Bonsiepe, 1984]

It is called circular because a communication happens, in which one does the analysis; then the synthesis of the analysis follows, and subsequently the evaluation, which goes back to communication and so on. A cycle, as can be seen in Figure 6, which simulates three dimensions.

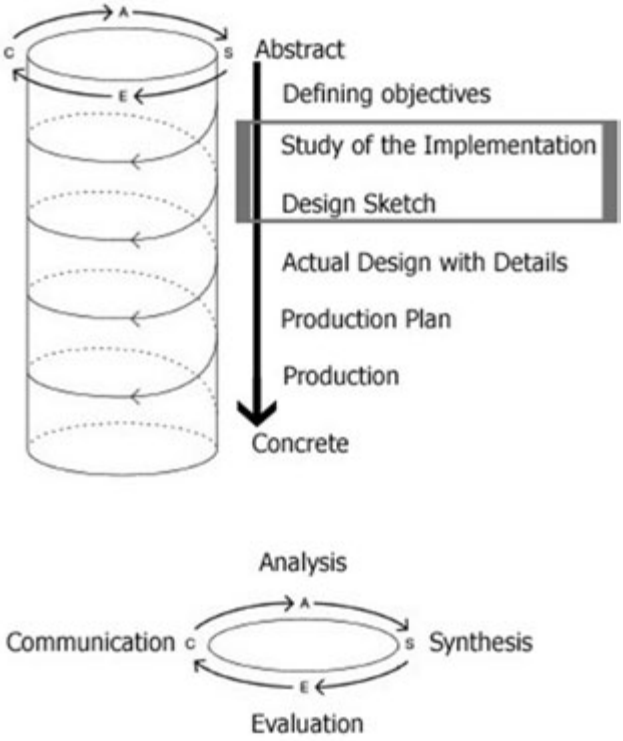

Fig. 6 Circle-shaped Method by Borzac.[Bonsiepe, 1984]

VDI Method

This method is descriptive, an interactive process of creating and producing varieties, as seen in Figure 8 consists of the following steps:

Problem > Sub-problem > Partial Main Solution > Various Concepts > Concept Variations > Chosen Solution > Development > Realization and Description (feasible)

According to Vasconcellos (2009) this model conceives parameters that are not diametrically opposed, it is not clear which are the criteria that make a difference between the four methods investigated. There is lack of information and each method is not explained but the emphasis is on the image of the phases of each one of them, as illustrated, with the purpose of being clear so that they can be applied by other people.

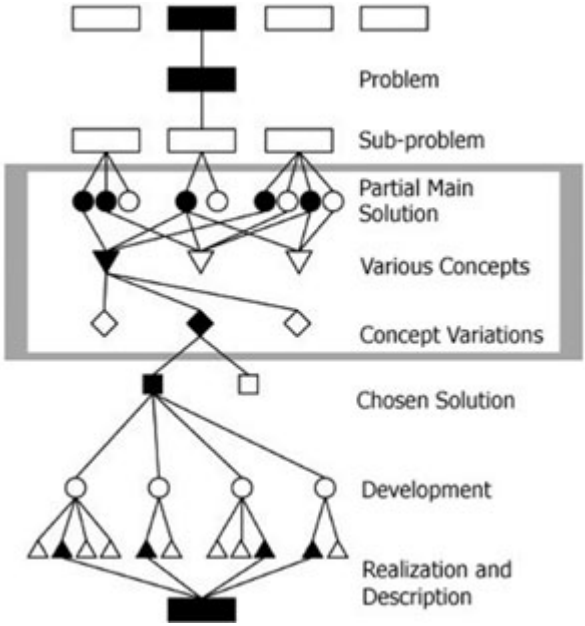

Fig. 7 VDI Method.[Bonsiepe, 1984]

Mike BAXTER's Method.

This method is descriptive, feedback, as seen in Figure 9, consists of the following steps:

1 Product Planning > 2 Conceptual Project > 3 Configuration Project > 4 Detailed project > 5 Design for Manufacturing

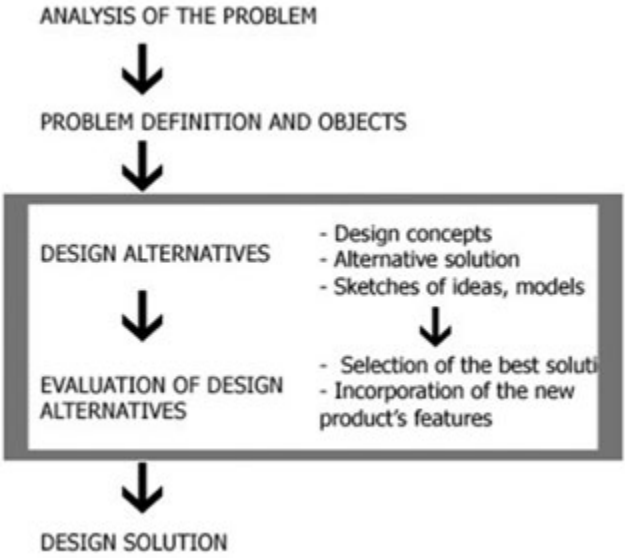

Fig. 8 *Mike BAXTER's Method.*

Tim BROWN's Method.

This method has as its goal the innovation in stores, processes, products and services. According to Brown (2009) Design Thinking depends on the balance of three factors: feasibility (the technological part, functionally possible in the near future), viability (the part of the stores, which is likely to become a model of sustainable shops) and desirability (the human part, which deals with people's emotions). See Image Nº10.

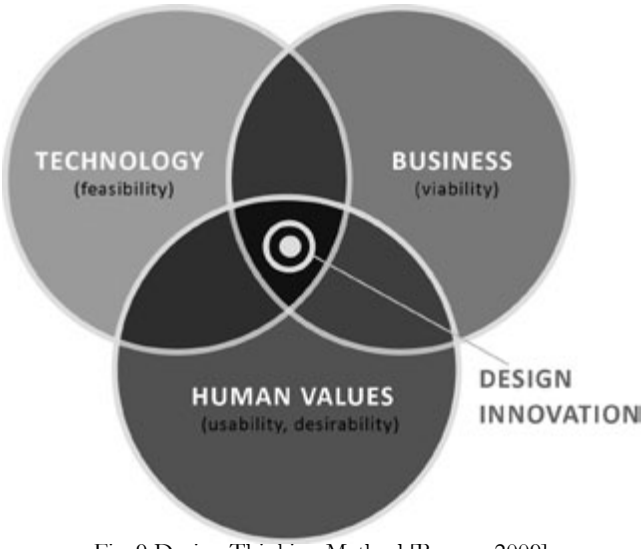

Fig. 9 Design Thinking Method.[Brown, 2009]

For Brown (2009) Design Thinking, the thought of Design, is an abstraction of the mental model used for many years by the designers to give birth to ideas. This mental model and its rooted concepts can be learned and used by anyone and applied in any setting, be it a shop or a social context.

LÖBACH's Method.

This Method is descriptive, linear, as seen in Figure 10, and consists of the following steps:

1 Analysis of the problem > 2 Problem definition and objects >Design alternatives > Evaluation of design alternatives > 5 Design solution

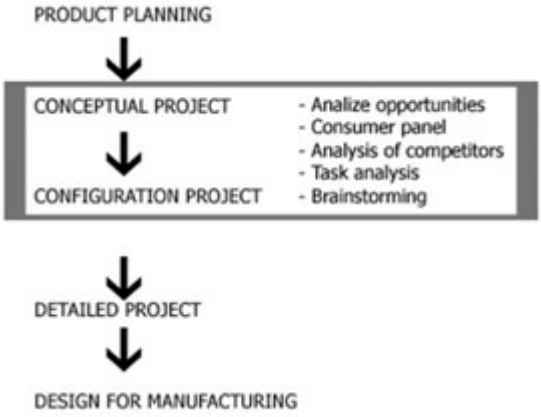

Fig. 10 Löbac's Method.[Löbach, 2001]

Bruno MUNARI's Method.

The author starts with the steps of "P" Problem> "DP" Defining the Problem> "CP" Components of the Problem> "DC" Data Collection> "DA" Data Analysis> "C" CREATIVITY> "TM" Technological Materials> "E" Experimentation> "M" Model> "V" Verification> "DC" Construction Drawing> "S" Solution. See Figure

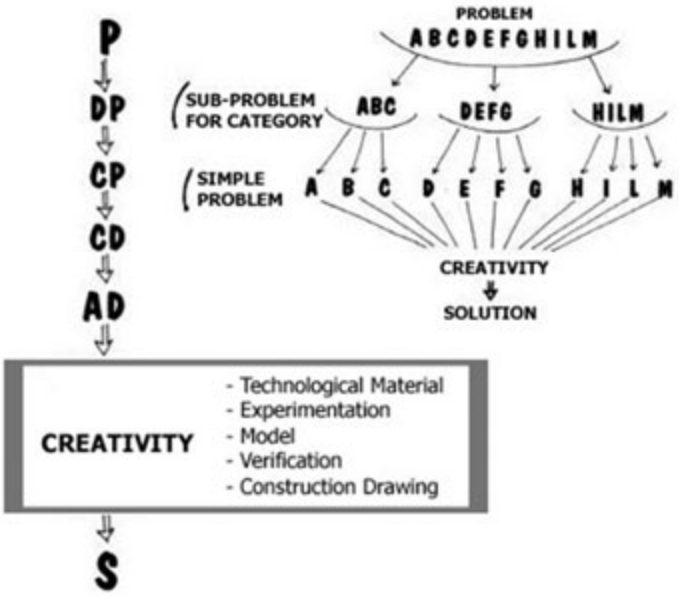

Fig. 11 Munari Method.[Bonsiepe, 1984]

Creativity helps in the formulation of ideas, in the collection of the possible technological materials for the project; it also helps in the direction taken when materials and tools are tested in order to get more data with which to establish relations (associations) useful to the projects. From here one can make a model to show the possibilities and the techniques to use in the project.

Next comes the "Verification" of the model and of the possible solution. With all the information the designer may begin to prepare scale or life-size sketches, with all the accurate measurements and all the information necessary for the implementation of the prototype.

Parameters of methodological comparison (Model)

For analytical purposes, methods were classified using five features, wich are parameters that differentiate them. A table was made for the comparison of these methods, wich are mentioned in detail in the thesis and periodical.

Metodologia / Analisi	**Archer**	**Bordak**	**Brown**	**Burdek**	**Baxter**	**VDI**	**Lobach**	**Munari**
1-Number of stages	7 stages	7 stages	3 stages	7 stages	5 stages	8 stages	5stages	7 stages
2- Order of creativity stages	5ft level	2nd and 3rd level	3 phases that, together, help in the creative process	5ft level	2nd and 3rd level	3rd, 4th and 5ft level	3rd and 4th level	6th level
3-Number of passages before and after the creative phase	Before: 4 After: 2	Before: 1 After: 3	-	Before: 4 After: 2	Before: 1 After: 2	Before: 2 After: 3	Before: 2 After: 1	Before: 5 After: 1
4- Composition of the creative phase	Synthesis, Development of Solutions, Definition of the Specificities of the General Solutions	Not described.	-	Concept - Generation of Alternatives	Conceptual Project and Configuration Project	Partial Solution and Diversified Concepts and Concept Variations	Design Alternatives and Evaluation of Design Alternatives	Concept – Generation of Alternatives
5- Amount of the elements of the creative phase, similarities and differences.	Non detailed	Non defined	Non detailed	Non detailed	More or less detailed	Non detailed	More or less detailed	The best in realtion to other methods, but not analyzed

Table 1 - Methodological comparison table [author]

Procedure

In the analysis we can see that the method used by Bruno Munari has a more detailed explanation of the creative process. There are few issues of the periodical Qualis A about the topic of design, if compared to other areas such as engineering and medicine. Therefore he worked on a limited amount of material, which dealt with the use of new methods created specifically for the areas of creativity and innovation. Like Brown's study (2009), in the book "Design Thinking".

This example is a way of seeing the attention and commitment in making or adapting new processes for the development of design projects. Commitment that grows more and more thanks to the incentives of the various institutions that promote research in this field.

Results of Methodologies Comparison

The results of methodologies comparison can be seen in the following diagrams, marked by numbers 1, 2, 3 and 4. The methods that comprehend creative phases in a more detailed way are first of all

Muneri´s, followed by Löbach´s and finally Baxter´s. In fact none of these methods has an in-depth analysis of the creative phase. A gap is evident when the methodology is studied.

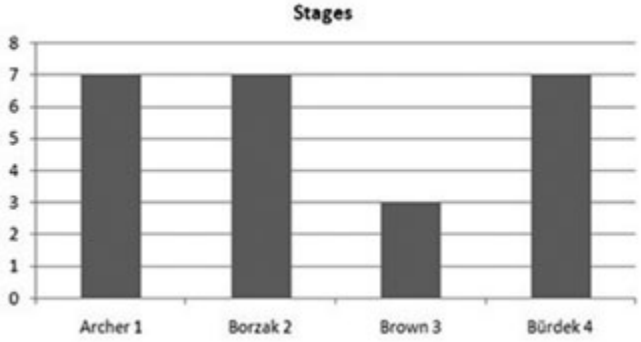

Diagram 1 – Comparison of Methods (Archer, Borzak, Brown and Bürdek) based on the number of phases [author]

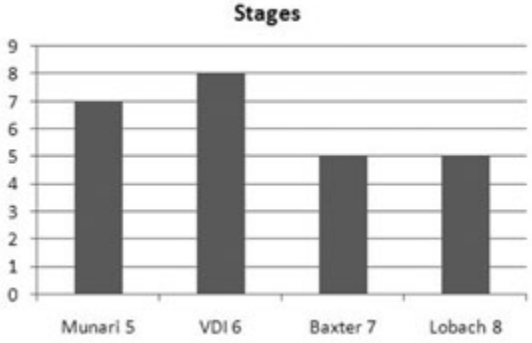

Diagram 2 – Comparison of Methods (Munari, VDI, Baxter and Löbach) based on the number of phases [author]

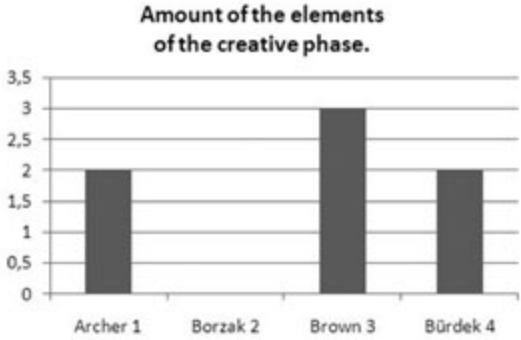

Diagram 3 – Comparison of Methods (Archer, Borzak, Brown and Bürdek) based on the number of creative phases [author]

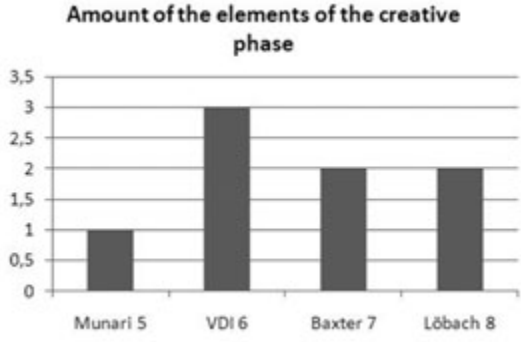

Diagram 4 – Comparison of Methods (Munari, VDI, Baxter and Löbach) based on the number of creative phases [author]

Targets of the Research

This research is aimed at teachers, professionals, researchers and students of the area of design and similar areas or at those interested in the topic of creativity.

Expected Results

The results of this study are important for updating the information on existing methods in the field of design, in addition to offering the design community scientific and professional help to choose

the most suitable method for each type of job. All this is useful to make room for new creative ideas and then to increase the range of options for methodological choices regarding the collection of data and the development of the project. An increase in creative solutions contributes to innovation and economic growth of countries. Therefore, intellectual production on creativity will be made for the publication of books, periodicals and journals for the teaching of design.

Future Developments

This study continues the author's doctoral research on the topics of creativity and design, to create new tools in support of the creative stimuli for people working in the design field. This article is a way to promote a broad search with other points of comparison or with other methods.

Conclusions

Many authors use brainstorm creative technics, calling them with different names, such as "communication", "Abstract" and "Concept", among others. According to the research of creative technics done in 2009 by Moroni (2009, 2010, 2011, 2012 and 2014) brainstorm is always chosen to find the solution to a given problem. There are various methodologies; in the university is taught the traditional method of the area of design. In virtue of the many areas of design, other projectual methods have been created in order to adapt to the new pace of the market, focusing on creativity, creative process, management and material and non-material innovation. Therefore there is not an in-depth analysis of the creative process, which is important to encourage the development of innovative projects.

Acknowledgements

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Airport Lean Design

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Abstract

The Aviation Industry challenge airports with capacity and quality demands. Airport Terminal Design is becoming more critical as a part of the aviation industry supply chain because it affects the operation phase of the airport, therefore capacity, efficiency and passenger experience quality.

Traditional design methodologies based on schematic approaches are not sensible to the general variability of the operation phase. Expensive design errors showed the need to push design towards more integrated processes based on information sharing within the Design Team, Airport Owner, Authorities, etc.

The research introduced in this paper proposes the experimentation of innovative methodologies and tools for Airport Design, aiming to simplify project activities, eliminate errors (wastes) and to improve the value of the design itself to the user. Such methodologies are identified as Lean Processes. The originality of the research is in its transfer to Project Design Management, integrating aspects of the operation phase since the inception of the design.

Generating value during the design is crucial to identify needs and to convert them in design requirements and performance sets, i.e. project information.

Consequentially, construction, operation and de-commisioning are driven by knowledge-intensive and model-based information. Lean methodologies enable an integrated approach throughout the whole project life cycle, increasing the reliability of the process.

The aim is to define a Lean Design Methodology to be field-tested on international airport case studies. Integrated Lean Design goes through all the phases of the design and project life cycle, offering a general methodology that can be tailored according to the case studies through the tools. National and international airport terminal project case studies will be used for testing the methodology and its tools in the field.

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The expected results of this research are a project design and management methodology and design tools. BIM tools are seen as a technological backbone for project information management and documentation production in the life cycle, improving integration of the process and allowing coherence in project information creation and management. Areas for improvement of common practices based on Lean mindset principles are defined within this research.

Keywords
Project Design Management, Airport Terminal Design, Lean Design, Design Science Research, Information Modeling, Design Methodologies and Tools, Project development, Building Information Modeling & Management

Capacity and quality challenge for the Aviation Industry

The European Commission with its 2011 Communication (EU: European Commission, 2011a) to the European Parliament has set new quality, capacity and environment targets for the development of the Common Air Space 2030. The EC Regulation Single European Sky II (EU: European Commission, 2011b) aims to increase economic growth, connectivity and sustainable mobility. It also introduces a set of Key Performance Indicators for the Aviation Industry.

To confront the traffic growth foreseen for 2030 (Eurocontrol, 2013a) airports have to align their development with the other means of transport, considering the resistance and the resilience of the system. They have to maintain an acceptable Level of Service (de Neufville R., Odoni A., 2003) under any circumstances to deliver a quality passenger experience (Bosi, 2014b). Therefore is necessary to manage the quality of the service and the entire life cycle of the project. Often the airport owner and the designers do not have the required profiles and skills to achieve and manage an integrated project (Esposito & Macchi, 2012).

The Architecture, Engineering and Construction Industry (AEC) needs to include the technical prescriptions of the specific sector. The airport project is characterized by the participation of many experts coming from different areas and the impermanence of their rapport. This causes the need for a greater level of integration in comparison to other typologies of projects.

In recent years the necessity to improve project development process performances has grown in parallel with market competitiveness

and projects' general complexity. Inefficiency of communication, lack of information and document output errors are the most common and important problems of Design Management, causing disruptions in the integration of multidisciplinary contributes in the project. In addition, reworkings cause overlaps in the latter phases, between Final Proposals and the start of the construction phase. This rework leads to incremental cost and schedule increases (Tzortzopoulos & Formoso 1999; Esposito & Macchi, 2012).

Moreover documental output planning and control do not have the required level of efficiency in common practices, culminating in project non-compliances with technical references and current regulations (Bosi, 2014a).

Traditional design methodologies based on schematic approaches are not sensible to the variability of the operation phase of airports. According to Harrison and Popovic (2012) the greatest failures of common practices are:

- Constrictions originated by the airport and the outer system.
- Aviation Industry Stakeholders' vagueness about the Level of Service (LOS) concept. A higher LOS – being based on metrics – does not necessarily convey superior services to the passenger.
- Asymmetry in the LOS/Passenger Experience relationship. Adhering to required LOS does not imply a satisfying passenger experience.

Common practices in design are mostly guided by previous experiences and are lacking in a structured approach. This has led to million-dollar-worth "cut and try" designs that failed (Harrison & Popovic, 2012). Understanding final user needs – i.e. their meaning of value – is one of the pillars of the Lean Theory (Koskela, 2000) and is necessary to achieve airport terminal projects that convey a quality passenger experience, fulfill capacity requirements and provide an adequate overall LOS in every condition, that is infrastructure resilience achieved through design.

Transferring the Lean Mindset from construction (Biton & Howell, 2013) to Project Design Development (Mesa & Howell, 2013) implies the involvement of all parties, to identify and define the specific meaning of value for the project, along with the sub-processes that generate and add it to the final product (Bosi, 2014a). Starting from this synergies will be developed an Airport Design Process Value Stream Map (Emmit et al., 2004; Bogus et al., 2008).

In Airport Terminal Design the performance-based approach prevails, responding to the evolving nature of the airport project and the Life Cycle Design model. Issues related to the integration of Information Modeling to solve design problems and its implementation will be examined, together with the management of the disposal of the building.

The AEC Industry is based on products and services, therefore focusing on the project development flow might result in major benefits for the final users in terms of value (Koskela, 2000), where the project is intended as final product (Emmitt et al. 2004; Bertelsen, 2013).

The International Group for Lean Construction defined in 1993 the fundament of Lean Mindset: The principle at the base of Lean is meeting requirements of the project with a lower consumption of resources. Its focus are delivering the maximum value for the customer (i.e. final user) and the continuous improvement of the process.

Lean implementation in common practices can boost the performances of the design team. Prerequisites for its integration are:

- Definition of design conventions;
- Management of communication processes in project teams.

Lean Project Management aims to integrate project objectives and defined requirements using methods and tools that increment the effectiveness and efficiency of the single processes. This reduces wastes (Koskela, 2000; Koskela et al., 2013) and improves the coordination and integration of the project team (Tzortzopoulos & Formoso, 1999; Emmitt & Sander 2004; Rocha & Formoso, 2012).

Value pursuit has to be carried out with proper tools. Both Lean and Building Information Modeling are having a deep impact on the Industry. Research have proven that the project visualization capabilities allowed by Building Information Modeling improve the reliability of the process, permitting the Design Team to view and control the project development process and to map the tasks for every project element and stakeholder (Dave et al., 2010; Sacks & Koskela, 2010; Eastman et al. 2011; Ciribini, 2013). Process reliability is one of the keys of Lean.

Involving the stakeholders in a downstream flow to gather feedbacks on the model and granting access to the most updated information on production is also important. At the inception of design their contribution is most valuable, especially regarding the constructability of the model and the Level of Detail (Dave et al. 2013; Sacks & Koskela, 2010).

The novelty of the research is applying Lean theory to the project development process, developing a methodologies that applies two transformative technologies (Sacks & Koskela, 2010) to the design process.

Transferring Lean to Design Management & Project Development

The problem addressed by the research is the implementation Integrated Design Methodologies in the Design Process of green airport terminals.

The research deals with methodological aspects of the project, using case studies and field experimentation to draw useful elements to define a design methodology and tools based on the Lean Mindset. These aim to generate value for the end users with the project, reducing and possibly eliminating wastes in project development activities. Wastes are defined for this work as man-hours and re-workings.

Moreover the research aims to clarify the contemporary scenario and to foresee tendencies in project design emerging from surveys conducted on case studies, best practices and problems observed in the current Airport Terminal Design Project methodologies.

The interactions between Lean and Information Modeling and their combination can have a transformative power on the project development process and the design process as a whole. The transformation-value mindset and by consequence Integrated Lean Design goes through all the phases of the design and project life cycle, having also strong constructive interactions with the later phases of the building life cycle.

BIM tools are seen as a technology backbone for project information management and documentation production in the life cycle, improving integration of the process and allowing coherence in project information creation and management.

Research methodology overview

The research program foresees the definition of the industrial and scientific problem, through the analysis of the state of the art , international best practices and Integrated Airport Design case studies, where innovative project methodologies were used with Integrated Design tools and technologies.

A literature review on the topics of Airport Design, Lean Mindset, Lean Processes, Lean Project Delivery, Lean Design Management,

Integrated Project Delivery and Information Modeling deepened the scientific problem and study the interactions between Lean Project Design Delivery and Airport Terminal Design. Most of the references are international, considering the relevance of related studies conducted by universities and research groups worldwide. Manuals produced on the subject by international researchers allow to acquire the theoretical foundations of Building Information Modeling with specific reference to the organization of the Information produced in the project output of the design industry.

Is expected the involvement of airport owners and multidisciplinary design teams, using both synergies already developed thanks to previous researches (PLANe©, GAMe©, GREAT©, BASIC©, LEAD©, etc.; www.txpresearch.wordpress.com) and newly instituted relations developed within seminars, workshops and the research in general.

From the State of the Art analysis is drawn the needed knowledge to understand the Project Development Process for airport terminals and its relationship with the building life cycle and specifically the Operation and Maintenance phase of the building, the longest in terms of time. The stakeholders involved in the project will be profiled with interviews and semi-structured questionnaires.

The main criticalities of the common practice in Airport Terminal Design will be pinpointed with custom Process Register forms, to highlight bottlenecks and wastes.

Will be drawn elements useful to the research according to the main objectives of the research:

- Definition of a scenario related to the inherent problems in the design process of the airport terminals
- The identification of the information needs of different stakeholders - users involved in the design process and the corresponding methodological approaches and ICT/IM used in relation to the various design activities.

These activities will be sided by the analysis of already completed projects on topics of interest for the research regarding collaborative design (Project Avanti, 2009) and Airport Design (Queensland University of Technology, 2012).

Case studies of BIM integration in Airport Design practices will be analyzed, to study the penetration of Information Modeling & Management technologies in the industry.

This will allow to define the state of the art and draw elements for Lean Project Development methodology. In addition to these, the

information modeling tools already developed by TxP Research will be refined and field tested on international case studies.

Expected results

The research and its final products aim to define a Lean project design development methodology for airport terminals through the technological-performance analysis, the use of tools and models useful for improving process efficiency and therefore value. The methodology will provide Integrated Project Delivery teams a medium for close collaboration and integration that crosses normal company boundaries. The general methodology can be tailored according to the case studies through the tools. National and international airport terminal project case studies will be used for testing the methodology and its tools in the field.

It will be possible to arrive at the development of terminal concepts, that are needed to translate reference requirements into specific design details. These terminal concepts will be applicable to new projects as well as to those projects in the masterplan or preliminary design phases and will allow users to achieve the sustainability requirements of the Horizon2020 Research & Development framework.

The developed methodology is expected to streamline the project flow. These meets the wishes of the Italian Authority for Civil Aviation's (Ente Nazionale Aviazione Civile, ENAC), that aims to a faster projects approval to reduce times and costs for the national airport network.

Recipients of the research and feasibility

The recipients and potential funders are:

- The scientific field of reference, which can further research and further develop its products;
- Stakeholders from the civil aviation industry;
- Managers interested in airport development methodologies and design verification . The client - especially if it also has to manage the work - takes decisions based on projects' risks and could use the integrated IM tools to optimize procurement and contract management.

The civil aviation industry and airport owners will be direct beneficiaries, the latter being the earliest adopters of the production facility: the airport is intended as an embarking factory. Indirect recipients are the other parties involved in the Airport supply chain:

customers (eg. Airlines), users (passengers), designers, construction companies and manufacturers of components and systems that can integrate the information model that is the backbone of the methodology. The research will constitute a database on the state of the art of design methodologies for green terminals, in addition to defining methodologies and tools for project delivery management. Another strength is the integration and the impetus to the improvement of Information Modeling-related methodologies for the design, with the possibility of obtaining technical and scientific support from stakeholders from the industry, multidisciplinary design teams and professional software developers.

Possible difficulties may arise from potential lack of information, due to the asymmetry of information channels regarding already published case studies and available material during the field-tests of the methodology.

Future developments

The definition and development of a Lean methodology leaves questions unanswered and areas for development. It provides the possibility to extend field-proven methodologies to other types of buildings with a knowledge transfer.

Interest for the research could be expressed by universities, the industry, airport management companies, project participants in general and especially designers of the Aviation Industry.

It is assumed the finalization of the research results in a form of learning, aimed to align the design cultures of Architecture, Engineering, Economics & Finance with the quality requirements of civil aviation, with the PhD Candidate seen as vehicle of expertise. Studies in Design Science Research applied to Design Process Management offer an opportunity to reflect and discuss on Lean theory application in general and its transfer to the other phases of the building process.

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Italian construction Medium Sized firms internationalization. Opportunities in Emerging countries construction markets.

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Abstract

The financial, social and political crisis is affecting the world market since 2008 and it's deeply conditioning player's investment strategies in national and international construction market. The proposed scenario, that wants to increase the Italian construction industry, concerns both new investment strategies in local markets and promotion in firm's internationalization. Also the European Union supports the construction firm's internationalization with a strategy for integrating the European construction companies in the global market, and besides, to develop an efficient policy controlling foreign companies that want to enter in the European market.

The project research's development done during the first PhD year take in evidence that the State of the Art highlights how scientific research world has focused the analysis on the biggest construction Emerging countries markets, overlooking those that have slower growth than BRICS. The "Overlooked Emerging Countries" are characterized by potential construction investment opportunities for Italian firms that want to adopt an internationalization strategy in order to raise their productivity. At the same time the analysis of firm's internationalization strategies are mainly on multinational companies overlooking market opportunities for medium-sized firms. These last kind of companies are more widespread in European (and consequently Italian) construction scenario.

From a methodological point of view the project research will develop a factor analysis method with the objective to find out Overlooked Emerging Countries's factors (For example: Political stability, Macroeconomic scenario, Construction sector requirements, etc.) to use for build up a SWOT Analysis. This tool will be useful

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for identifying Overlooked Emerging Countries's characteristics and potential investment opportunities for Italian medium sized firms that want to adopt an internationalization process.

The analysis of medium-sized firms will take the cue from structured and in-depth researches on multinational construction companies based on theories of settlement in market and also on risk management's skills.

Keywords

Internationalization, Emerging Countries, Construction Medium Sized Firms

Introduction

The financial, social and political crisis is affecting the world market since 2008 and it's deeply conditioning player's investment strategies in national and international construction market. The emergency situation is reported from official sources like ANCE[1] (Figure 1) and also it's supported by professionals who say: "In next years small and medium sized firms will have to specialize their know-how and labor force in order to collaborate with others professionals in complex and integrated projects. In particular for medium sized firms will be required to walk through three possible ways: small and medium sized firm's partnership, strategic alliance between firms with same dimension and medium sized firm's network. For small and medium sized firms will be essential enhance management, technical and industrial skills with the objective to improve their competitiveness into local and global markets." (De Biasio, 2013) (Figure 2). The proposed scenario, that wants to increase the Italian construction industry, concerns both new investment strategies in local markets and promotion in firm's internationalization. "In last four-five years the biggest italian construction firms were able to adress their productivity from 30% in foreign markets and 70% in local market, to 70% in foreign markets and 30% in local market. Others construction firms opened branches in foreign countries." (Robba, 2013)

Fig. 1 Italian construction investments. [ANCE, Dicembre 2013]

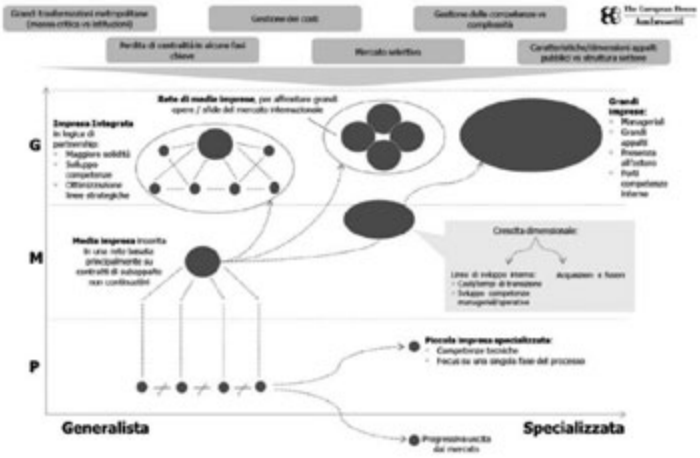

Fig. 2 Innovative strategies of firms aggregations [The European House Ambrosetti]

Also the European Union supports the construction firm's internationalization with a strategy for integrating the European construction companies in the global market, and besides, to develop an efficient policy controlling foreign companies that want to enter in the European market. In the European Commission's report "Strategy for the sustainable competitiveness of the construction sector and its enterprises" there are some suggestions that aim to help European companies to enter in foreign construction/real estate market: Eurocodes, intercontinental Forum for sustainable construction, "Build up Skills" and "Small Business, Big world" projects and Structural and Cohesion Funds. "The Strategy focuses on five key objectives: (a) stimulating favourable investment conditions; (b) improving the human-capital basis of the construction sector; (c) improving resource efficiency, environmental performance and business opportunities; (d) strengthening the Internal Market for construction; (e) fostering the global competitive position of EU construction enterprises". (European Commission, 2012)

In the annual report of European Small and Medium sized firm[2], the European Community take in evidence that: "The role of SMEs is crucial for the European economic recovery - their number, employment capacity and value added constitute a large share of the European economy. Providing the right conditions in which SMEs can flourish is paramount for ensuring a sustained recovery and achieving prosperity for all EU citizens." (European Commission, 2012/2013).

At global level, Countries that haven't been affected by crisis but, on the contrary, have experienced a strong economic growth are the Emerging Countries (Figure 3). The Enrst & Young's report Rapid-growth markets take off some highlights about four key elements useful to identify Countries that are subjected to a particular and interesting economic growth: "Political stability and strong leadership is crucial, especially when augmented by a stable and prudent macroeconomic policy. High capital investment, particularly in infrastructure, is another key driver of growth; as is an open and balanced trade policy that can be adapted over time." (Ernst & Young).

Fig. 3 G7 and emerging markets: GDP growth [Oxford Economics]

In the analysis of the State of the Art done during the first PhD year it's possible to sum up that a strategic approach based on know-how specialization and entrepreneurial internationalization will be a potential opportunity for Italian medium sized construction firm's relaunch in particular in the Emerging countries construction markets.

Resarch Project's objective

The State of the Art highlights how scientific research world has focused the analysis on the biggest construction Emerging countries markets, overlooking those that have slower growth than BRICS[3]. The "overlooked Emerging countries" are characterized by potential construction investment opportunities for Italian medium sized firms that want to adopt an internationalization strategy in order to raise their productivity. The Emerging countries that will be taken into consideration as potential case studies are (Figure 4):

- Colombia: in recent years it's recording a strong growth in construction sector in particular housing and infrastructure projects[4];
- Qatar: It provides a strong economic growth supported by significant investment in the construction sector[5]:
- Turkey: It records slower economic growth than other Emerging countries but it's an excellent investment opportunity for geographical reasons[6]:

Real GDP growth						
	2011	2012	2013	2014	2015	2016
Americas	**4.2**	**2.6**	**3.8**	**4.8**	**4.5**	**4.2**
Argentina	8.9	1.7	3.1	4.5	4.2	3.8
Brazil	2.7	1.0	3.9	4.9	4.8	4.3
Chile	5.9	5.7	4.5	4.5	4.1	3.9
Colombia	5.9	4.0	4.2	4.4	4.1	4.0
Mexico	3.9	3.9	3.7	4.9	4.5	4.3
EMEIA	**6.2**	**4.0**	**4.2**	**5.3**	**5.5**	**5.4**
Czech Republic	1.9	-1.1	-0.5	1.9	2.7	3.0
Egypt	1.8	2.2	2.1	4.0	5.9	5.9
Ghana	14.4	7.1	6.9	5.9	5.5	5.0
India	7.5	5.4	6.0	7.5	7.9	7.8
Kazakhstan	7.5	4.9	6.0	7.5	7.1	6.7
Nigeria	7.3	6.5	6.5	6.1	5.5	5.1
Poland	4.3	2.2	1.6	3.1	3.8	4.2
Qatar	13.0	6.0	5.5	5.9	6.1	6.0
Russia	4.3	3.6	3.6	4.1	4.0	3.9
Saudi Arabia	8.5	6.8	4.1	4.3	4.2	3.8
South Africa	3.5	2.5	3.0	4.2	4.4	4.7
Turkey	8.5	2.6	4.3	5.6	5.3	5.3
Ukraine	5.2	0.6	2.4	4.6	4.1	3.9
United Arab Emirates	4.2	3.3	3.7	3.9	4.1	3.8
Asia	**7.5**	**6.3**	**7.0**	**7.8**	**7.4**	**7.1**
China and Hong Kong	9.1	7.4	8.1	8.8	8.3	7.9
Indonesia	6.5	6.1	6.2	6.0	5.4	5.5
Korea	3.6	2.1	3.3	5.0	4.8	4.4
Malaysia	5.1	5.1	4.3	4.7	4.3	4.4
Thailand	0.1	6.0	5.3	5.4	5.5	5.0
Vietnam	6.0	5.0	5.5	6.9	7.1	6.6
Total	**6.4**	**4.7**	**5.4**	**6.4**	**6.2**	**6.0**

Fig. 4 Real GDP growth. In evidence the three emerging countries "case study" [Ernst & Young, October 2013]

At the same time the analysis of firm's internationalization strategies in the construction market are mainly focused on multinational companies overlooking market opportunities for medium-sized firms. These last kind of companies are more widespread in European (and consequently Italian) construction scenario. Preparing Italian medium-sized construction firms to accommodate the international market demand would create new positions in the construction sector which in Europe accounts for 90% of the employment in medium-sized firms. On the other hand starting an internationalization path will mean for the Italian medium sized construction firms create an opportunity to improve and adapt skills acquired in the local market into the dynamic global market.

Researchers also underline clear ideas to deepen the two topics "Emerging countries construction market opportunities" and "firms internationalization". Ortiz, O., Castells, F., & Sonnemann, for example, stressed the lack of best practice information in sustainable building practice in Emerging countries. Pedeliento, G., Threesome, O. & Andreini say that: "could be useful a qualitative/exploratory study in order to find out the reasons (endogenous and exogenous) behind internationalization choices of Italian contractors".

In referee to the two research topics, it's possible to outline two research questions:

- What are the operative tools and strategies usable to harmonize local Emerging countries construction market for the input of medium-sized Italian construction firms?
- How can medium-sized Italian construction firms use their know-how to enter in the global market?

In relation with the above-named questions, the research aims to define a model that take in evidence strength and weakness factors for italian construction medium sized firm's internationalization in the global market, in particular into the "Overlooked Emerging countries" construction market taken into consideration as case studies.

Research methodology

From a methodological point of view, the scientific overlook has produced some interesting insights to stress the two topics in order to answer the two research questions. Regarding the analysis of Emerging countries construction market opportunities will be considered the four characteristics described in Ernst & Young's Rapid -growth markets developing a SWOT Analysis (Strengths , Weaknesses, Opportunities , and Threats) similar to those described in Shen L., Zhao Z. & Drew D.'s article. Medium sized construction firms need to know which are the Strengths, Weaknesses, Opportunities, and Threats of the Emerging countries construction market "case study" in order to plan an efficient strategy to enter in these markets. In particular strength and weakness are considered internal factors, which implies that they comprise internal aspects such as financial resources and technological position. On the other hand, opportunity and threat represent external aspects such as competitive environments resulting from changes in governmental policies and society, as well as the international environment (Porter, 1980). Table 1 indicates the principals factors,

clustered by two macrocathegories: "Internal factors" (Strengths and Weaknesses – SW) and "External factors" (Opportunities, and Threats – OT) that characterize SWOT Analysis. To support the advancement of the SWOT Analysis it's also expected to map what's happening in the Emerging countries "case study" construction market, how many join projects are going on, what kind of projects and how many European professionals are requesting professional licenses to work in the countries.

Classification	**Factor**
Strength and Weakness (SW)	
Internal factors	Labor ability
	Technical ability
	Financing ability
	Management ability
	Experience
	International relationship
Opportunities and Treats (OT)	
External factors	Global environment
	Domestic environment

Tab. 1 - Classification of Internal and external Factors for Strength, Weakness, Opportunities, and Treats (SWOT) Analysis [Shen, Zhao, & Drew, 2006]

In a long-term strategic vision for maintaining their competitiveness on the international construction market, medium sized construction firms will have to adopt a dynamic entrepreneurial policy able to convert their know-how (technical skills and labor force). Ghemawat presenting a framework that would enable firms to reposition and readapt their business. He emphasized that any firm that engages in international business must select the most suitable strategy from among the following three distinct types of global strategies: maximizing the local or country relevance for boosting revenues and market shares, achieving economies of scale undertaking regional or global operations, and exploiting the differences among national or regional markets. These three strategies are known as adaptation, aggregation, and arbitrage, respectively. Table 2 shows AAA Analysis's principals

frameworks, classified by competitive advantage, coordination and cooperate diplomacy.

The analysis of medium-sized firms will take the cue from structured and in-depth researches on multinational construction companies based on theories of settlement in market such as described in the paper Strategies for contractors to sustain growth in the global construction market (Han, Yim, Jang, & Choi, 34/2010) and also based on risk management's skills well analyzed in Application of project risk management and performance indices in the construction sector : a case study (Ciaramella, Giugno 2013). Han & James classified the international construction risks into the following five categories: political, economic, cultural/legal, technical, and other risks. Risks may create problematic situations; therefore, the construction industry in developing countries may encounter similar risk factors, including a lack of management skills, shortage of skilled labor, low productivity, shortage of supplies, poor quality supplies, and lack of equipment (Ofori, 2003).

The relationship between SWOT Analysis on Emerging countries construction market and risk management is clear: Baloi & Price emphasize that cost performance may be influenced by risk factors such as design, competitiveness, customs and cultures, construction, and economic conditions. In addition, they compare various risk modeling approaches and methods to identify those that could handle uncertainty effectively. Risks may emerge as weakness internally and threats externally for those companies that do not handle them effectively. On the contrary, handling risks effectively may create internal strengths and external opportunities.

Research's Stakeholders

Research's stakeholders can be divided in two categories: direct and indirect beneficiary. In the first category there are Italian medium sized construction firms that express an interest to start an internationalization process and, at the same time, will contribute to collect data usable for developing the research. ANCE, Assimpredil and ICE[7] will be fundamental to individuate what kind of firm's aggregation (partnership, strategic alliances or firm's network) will be suitable for the Italian medium sized construction firms in order to enter in the global market. Another direct stakeholder are subjects of the Emerging countries "case study" construction market demand.

It's important to know what are the types of the Emerging countries construction market demand to individuate what are the best outcomes

of the Italian medium sized construction firms to export in these foreign markets.

In the indirect stakeholders category there is the national and international academic world, in particular researches that work on these topics, interested to develop a collaboration in order to create a stream information on global construction market dynamics useful for the university to become a fundamental "ambassador" that helps italian medium sized construction firms to face the challenges of the foreign markets.

Research's outcomes

In the light of the potential direct and indirect stakeholders and in relation with research's methods and tools (SWOT, AAA and Risk Analysis) it's expected to collect enough data useful to sketch up a clear Emerging countries "case study" construction market scenario for supporting the Italian medium sized construction firms integration. Actually the Emerging countries "case study" construction markets demand requests the realization of infrastructures and houses, consequently products and services of the Italian medium sized construction firms will focus on that kind of supplies.

Furthermore it's expected to build up, or consolidate, collaborative relationships between researchers that work on this topic in order to outline the University like a mediator for the Italian medium sized construction firms offer and the Emerging countries "case study" construction market demand.

Research's forecast

Research's outcomes will sketch up an interesting scenario for direct and indirect stakeholders. The direct stakeholders will increase the foreign construction market cluster in order to give a more complete global scenario.

At the same time the indirect stakeholders will be not only a mediator for the Italian medium sized construction firms offer and the Emerging countries "case study" construction market demand, but they will play an important role of training and updating on the dynamic and increasingly specialized global construction market scenario.

Conclusions

During the project research's development done during the first PhD year and in the light of the bibliography analyzed it's clear the professionals and institutional point of view: it's necessary to start an internationalization process, in particular for Italian medium sized construction firms, with the objective to relaunch the Italian construction market. At the same time it's evident that the global markets that are searching for foreign firms in order to satisfy their demand are the Emerging countries, or rather countries that in last years were not bad-affected by the financial, social and political crisis. The Emerging countries "case study" construction markets have all the characteristics above named and, also, they still have an "embryonic" situation regarding sustainable skills for developing their local construction market.

The State of the Art have fully supplied the knowledge useful to adopt tools, like SWOT and AAA Analysis for develop the research's method. Data collection and its elaboration will be enriched by the opportunity to build up interesting relationships between other researchers that are working on this topic.

Breaking down the fears of the Italian medium-sized construction firms to enter in the international market thanks to the creation of partnerships, strategic alliances and firms network is one of the objectives of the research, which must and will have to provide a clear picture of how the medium Italian construction firms will be able to enter in the global market.

Notes

1. *Associazione Nazionale Costruttori Edili*; eng: National Association of Property Developers.
2. SMEs are defined in terms of the number of employees and either in terms of turnover or total balance sheet as follows: Medium- sized: Employees <250, Turnover < €50 million, Balance sheet total < €43 million.
3. Infrastructure and Residential/Commercial Construction are the key markets in the Colombian construction industry. With a share of 52.5% in 2011, infrastructure was the largest market, followed by the residential market that constituted a share of 34.7% in the same year. The construction sector has been one of the most dynamic sectors of the Colombian economy

registering an average growth from 2000 through 2011 of 6.9% versus 4.1% total GDP, which has resulted in increased participation in the economy rising from 4.2% in 2000 to 6.9% in 2011. Source: The International Trade Administration (ITA)

4. In regard to the construction industry, there are currently many US$ billion-worth projects, including the expansion of transport infrastructures and residential, commercial and hotel centres. The "Education City" and "Hamad Medical City" realization projects have been completed, in addition to infrastructure projects such as the new Doha International Airport mega-project worth 2,5 bln US$ or the 40 km-long bridge between Qatar and Bahrain, tourism development projects concentrated in the Qatar Tourism Master Plan (total fundings around 15 bln US$) and PMI industry development, also many hundred million dollars worth.
5. Despite the Eurozone crisis, the Turkish construction industry has outperformed neighboring countries. The industry recorded a CAGR of 10.17% during the review period. This growth was driven by the government's continued encouragement of foreign direct investment (FDI) and public-private partnerships (PPPs) in the country. The outlook for the Turkish construction industry is favorable as a result of the government's focus on developing physical and social infrastructure in the country. The industry is expected to record a CAGR of 9.33% over the forecast period.
6. BRICS is the acronym for an association of five major emerging national economies: Brazil, Russia, India, China, and South Africa. The grouping was originally known as "BRIC" before the inclusion of South Africa in 2011. The BRICS members are all developing or newly industrialised countries, but they are distinguished by their large, fast-growing economies and significant influence on regional and global affairs.
7. *Agenzia per la promozione all'estero e l'internazionalizzazione delle imprese italiane*; eng: Agency for the abroad promotion and the internationalization of Italian companies.

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Disposable terminal design

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Abstract

An airport terminal design must face a continuous growth in passengers. When an airport doesn't provide a good planning and programming of the infrastructure, the flow of passengers that the terminal must process reaches the system break-down. This determines the end of service of that specific terminal layout. There are even other reasons that determine the end of service for an airport terminal: the obsolescence of most of its parts; the technological solutions and systems achieving the end of service cycle. At this point it is necessary to establish the terminal location with respect its entire life cycle. Then it will be considered among available alternatives: the necessity of renewal and/or expansion or replacement of the terminal facility.

Given the short service cycle, the airport terminal design is an evolutive design process that should pursue both the economic and environmental sustainability. So, the qualitative judgment of the architectural solutions, the evaluation of the levels of service and the assessment of the initial investment are not enough. Indeed the whole life of the terminal must be considered, since the life-cycle is well-defined.

So it is necessary to understand which solution is the most fitting, among the expansion and substitution ones, stressing the economic and environmental sustainability. Both these aspects are relevant, considering the short service cycle of the terminal.

Life Cycle Costing methodology can help, as a tool for the project design management. This kind of evaluation can be integrated to a qualitative analysis (of the proposed architectural solutions) and to a quantitative assessment (of the levels of service granted). This family of tools, properly customized, can address the best choice in the terminal design, and it can be used at the final design stage.

Desk research is necessary, in order to examine in depth the Italian and European positions on the adoption of a life-cycle approach in public procurements (ISO 15686-5:2008 is about application of Life Cycle Costing on buildings and their parts). It is necessary to understand

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the current tools and methodologies adopted in design management by the airport design teams. LCC should be investigated to achieve better planning of economic sustainability trends in airport projects. The inventory of the missing data could be solved by developing average values, collecting European data. Once the tool has been tuned, it should be applied to a proper field experimentation.

Keywords
Airport Terminal Design, Evolutive Design, Project Design Management, Life Cycle Costing, Green Procurement

Introduction: design of an airport terminal

The airport terminal is the main building in an airport and is intended to accomodate and process departing and arriving passengers. This essential function of the terminal is accompanied by the need to ensure an adequate level of service, to be achieved through careful design of environments and locations. But the upward trend in the number of passengers per year and in the index of Typical Peak Hour Passenger (TPHP) means that the terminal must be readjusted periodically to ensure an adequate level of service. Therefore, the airport terminal is characterized by a short overall service cycle and short service cycles of its parts.

Concerning Italy, the airport owners have internal technical offices, which are in charge of airport planning and of terminal design. The entire planning and design process is supervised directly at a ministerial level. The goal of a proper design, pursued by both sides, is the "creation of a quality intervention and technically valid, in accordance with the best relationship between the benefits and the total costs of construction, maintenance and operation" .

Framework

Snapshot: The problem identified

The main problem that is intended to be solved is due to the necessity of renewing the terminal at the end of a service cycle. The possibilities are renewal/expansion or substitution when the airport reaches its ultimate last service life cycle . It is necessary to evaluate them according to the objectives of the capacity of the structure over time, the adequacy of the level of service offered, the environmental sustainability of technological and architectural solution, compared to

the entire life cycle cost.

The research, that is at a starting point and that is going to be presented in this essay, refers to the European and the Italian contexts.

The operating context

In the following paragraphs the problem leading to the research focus is described more in depth.

The European picture

The European context is now defined by the so-called "single sky" for air transport. The frame of needs is indicated by Eurocontrol report "Challenges of Growth" and the European Programme for Research H2020 - Mobility for Growth.

Here is clearly fixed a frame of growth in the air transport demand; the growth, of course, involves even Europe. The single airport will be invested by the problems of managing the air traffic of the system. It is a knot of the entire air transport net, through which the traffic of vehicles and of passengers is moved.

According to forecasts, Europe, as a part of the global trend, will face an increase in demand for air transport, which will remain unmet; the unsatisfied demand for air transport will be 1.9 million flights in 2035. Achieving and maintaining the capacity of an airport in a congested network is therefore one of the challenges identified by the European system. In addition, the challenge of promoting sustainable growth of the entire air transport network and the resilience to climate change has been underlined.

Design of an evolutive terminal

An airport terminal, as was mentioned in the introduction, is part of an overall infrastructure (the airport), which is characterized by the need to initially be oversized. At the scale of the airport terminal, the capacity is achieved with proper programming, planning and design. The terminal must be able to accommodate flow of users (passengers) increasing over the years. The building, which has to process an increasing number of passengers, will be characterized by subsequent service cycles, short and well defined, that will show as a whole the entire life cycle. Over time, the terminal (that was initially oversized) reaches

an inadequate Level of Service (LOS) , due to the saturation of space.

Also other causes condition the configuration of the service and life cycles, in addition to growth and capacity. Among these can be counted obsolescence of technological systems and subsystems, IT systems, machinery (e.g. BHS system), etc.

Thus, the terminal is designed to develop, ending more than one service cycle, until the completion of the entire life cycle. At the end of each operational (or service) cycle it is necessary to evaluate between the possibility of expansion and replacement of the building.

The challenge in planning and design actions is also in the pursuit of environmental and economic sustainability of the building (which is another European target), given the short service cycle of the airport terminals. These elements are all necessary when introducing a new design action.

Towards a solution

Snapshot: Hypothesis of solution

The main idea is to enhance the tools that are currently used by the design team, focusing on the cyclical nature of the terminal operation. The aim is to merge the architectural design with the concept of cost, intended as a parameter for measuring the efficiency of the solutions analyzing the life cycle of the terminal. To stress the economic parameter in architectural design means also to relate the architectural design and the environmental issues.

Life cycle costing of the design options at the end of the service life is an interesting tool, from the point of view of the design team. Beside other tool already used in the design process (e.g. LOS analysis), it can direct the design action towards the best design solution. LCC analysis, indeed, considers the entire life cycle of the design option (not only the initial costs of construction) to measure its cost, relating it to the requests of environmental and economic sustainability. The evaluation of the life cycle cost of the design option could help in the decision process, directing the following design steps.

LCC analysis, applied to the airport terminal design, should be integrated with a qualitative analysis of the architectural solution and

with a quantitative analysis of the level of service offered over time.

This kind of analysis, of course, is intended to be before the construction; it could be followed by the monitoring of the operation costs of the terminal, in addition to other kind of monitoring actions already adopted by the airport operator. In this way it could be possible to intervene when, where and in the way it is necessary.

Essentials of state of the art

The airport terminal is a building project in evolution, that at the end of service life is renewed/expanded or substituted if it is quite coincident with end of its life. This cyclic nature must be definitely faced during the design stage, considering the economic and environmental aspects, beside considerations about the level of service. Architectural design is usually oriented to the consideration of the only construction costs, which are not sufficient in the case of a strategic and evolving building. A different approach that takes care of the life cycle costs is necessary. On one hand, the approach pointed out by an ACRP research (described in the following paragraph) faces the life cycle proposing a method of a business-drive planning (instead of cost-oriented). On the other hand, a solution in the decision process is the life cycle cost analysis of the options (touched on before).

A business-driven airport planning

From 2006 to 2011 a research program has been conducted, promoted by Federal Aviation Administration (FAA), inside the Airport Cooperative Research Program. Its aim was to produce a step-by-step guide to conduct the designers in an evaluation of the design options of an airport terminal.

The process of evaluation proposed by the Guide is flexible and clear. It is all focused on the concept of business-driven planning and indicates different economic analysis at different stages of the design/planning action. At a first stage, the team acquires and establishes clear and achievable aims. Then it will be possible to formulate the design options, responding to those requirements; then the analysis process (financial analysis and comparison with the previous objectives) will indicate the best solution.

The researchers, referring to the American context, have not found any literature that could relate the economic analysis in the design process with the design options. The research team is aware that some airports use tools for the management of the facilities, but their

number is little and does not comprehend the airports that have been interviewed during the research program. In this program it has been pointed out the importance of considering the total life cycle costs, instead of just the initial capital cost. This kind of analysis is usually not included in the master plan action. But it is clearly important in such a stage, previous to the design action.

The life cycle cost analysis in construction

On the other hand, the literature leads, of course, to the application of the Life Cycle Cost analysis to the building and constructed asset (ISO 15686).

In the method proposed by ACRP, which, however, is focused on a vision of the life cycle, the LCC analysis is only one of the steps you must take to achieve a business-driven project and at the same time is not highlighted effectively the element of environmental sustainability. Then, the application of life cycle costing is only one of the analysis required by the guide ACRP that has been treated before. In the guide, in fact, LCC is required at the time of the definition of objectives; it is not included at the stage of comparison of project options.

Life cycle cost analysis is flexible. The integrated project team may choose to introduce it in the planning stage, or in the design phase; to analyze the outcomes of the project activity, or to compare two different projects. It allows you to keep under control the costs of the entire life cycle of the project solutions and to compare them, without losing sight of the impact of environmental sustainability in the economy of the final project.

The international standard ISO 15686 has been adopted in the Community unevenly. In recent years the European Union has commissioned a research program aimed at identifying a common procedure at Community level for the application of that legislation related to the construction industry. At present, the international standard ISO 15686- 5 (and all the corresponding series) has not been adopted in Italy. The Government is planning the adaptation of the procurement process to the European trend; it follows the need to adopt also in Italy the LCC as a way to achieve the Green Procurement.

Configuration of the research path

Goals and beneficiaries

The ultimate goal is to provide an operational tool for designers and supervisors, aimed at the project management of the airport terminal. It should be capable of adding quality to the final product, by accompanying the development of design alternatives with an economic analysis conducted on the entire life cycle.

Methodology

The identification of the next steps of the research, for now only configured at a preliminary stage, will come from the state of the art integration, with the assessment of the procedures actually used by the Italian and European airport owners to monitor the life cycle of the terminal, to define its end, to direct the design process from the economic point of view. The search path is then characterized by an initial modeling phase of the life cycle of an airport terminal, and the continuous monitoring of the relevant literature and of regulatory process. Then, a first draft of an operational tool (including numerical data and quality of the environments of the terminal in addition to the data provided by an LCC analysis) will be prepared. It will be essential to the comparison with other research environments, operating in the two areas covered by this research (economic and planning). This will correct and finalize the instrument. To conclude, it will be necessary to apply the tool to a proper case study.

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Part III - Conclusions

Scholarly Research: it's a matter of method

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Abstract

This paper gives an overview of the potential usefulness and limitations of different research methodologies. The observation has been applied by a sample of scholarly research in the Design, Engineering and Architectural Technology field. Its base hypothesis holds that the choice of methods to be applied in a research development process depends upon the discipline, the research type to be developed, and the purposes, the objectives and the expected results of the research. Furthermore it can be observed that the methodology it's accountable in term of research evaluation. Each methodology has its strengths and limitations, and it is associated with a certain risk of arriving at invalid outcomes. A method may be highly useful within one research development process, but less so in another. Something has to be considered for the associated tools. It presents a typology of research methods, and indicates which are the most appropriate to achieve each aim in the authors intention. It introduces the concept of a meta-design of the research development process under analysis as cases study in which methods are used as tools to achieve the objectives and general set-up of a research process.

Keywords

Research, Research Methodologies, Research Trends, Scholars, Doctoral Research

The increasing importance of methodology in the scholarly research

In the current economic environment budget restrictions and shrinking funding make difficult to secure research activities; wholesome assessment is of immense importance for the advance of scientific and research programs and institutions.

A robust research methodology is on the other hand needed to ensure results and become itself an integral and valuable part of any scientific activity.

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It is - like the assessment exercise shows - an on-going process aimed at ensuring the achievement of scholarly research results. Lots of methods are used in the academia as they relate to research activity variety.

In the framework presented here methodology is seen as a combination of methods and tools that can be modelled, changed and composed in different manners over time to ensure that the final results of a scientific program, by an individual researcher or a team is successful and in line with the laid out goals and objectives.

Research method is considered a key factor in securing consistency of science results but it is also possible to evaluate its effectiveness with regards to the research process itself. The manner by which research is performed and executed is a key matter for a wide range of stakeholders including scholarly research advisors, program directors, research administrators, policy makers and heads of scientific institutions as well as individual researchers looking for tenure, promotion or to secure funding at different level. These stakeholders have also an increasing attention to the quality of research because of competition for resources and needed and accountability requisite by control bodies (Hicks, 2009 cit. in Moed, 2014).

There are several methods that can be adopted in our research domain depending upon the specific discipline, topic and aims of research. Nevertheless it is possible to try the Design, Engineering and Architectural Technology sector widely adopted methods description starting from on-going scholarly research thesis[1].

The following common trends can be identified within the domain of research methodologies.

Literature review

It is a text - usually 15-20 pages or longer - of a scholarly paper/ report about the current state of the art of knowledge and the latest findings, also including theory and methodology contributions related to the main topic of the literature review. It uses secondary sources and does not report new or original experimental work. There are three types of literature review: in a doctoral thesis, dissertation or scientific journal paper reviewed by peer and academics in general, the literature review usually anticipates the methodology and expected results section; a second type of literature review occurs in a research proposal; a third type is a methodical review regarding a specific research question. Research evidence is the target of this review, highlighting findings

and arguments that are important for the main question. According to literature (Shields and Rangarajan, 2013), the process of reviewing literature sources and the final product itself have to be told apart. The first constantly feeds various facets and consequent activities of the research project, basically being a continuing process throughout the research, comprehending all of the most recent literature on topics of interest. This process has to be continued during the doctoral research to aim to a complete and extensive literature review.

Taxonomy of the cognitive domain

Taking into account Bloom's revised taxonomy of the cognitive domain, the literature review process entangles the Remembering, Understanding, Applying, Analysing, Evaluating and Creating ways of thinking.

Remembering: During this stage relevant texts are identified and read. Bloom's second category Understanding may be applied as the scholar learns and apprehends from the collected readings and material. It's not possible to write properly and with proficiency without knowing the appropriate terminology and without understanding the basics of the study topic.

Third category Applying: the literature sources found for the review are connected with doctoral research project. In the fields of Architecture, Industrial Design and Engineering the connection between literature review and research project is very close.

The research framework and the research outline are developed in the fourth stage of the literature review, the Analysis. Their strengths and weaknesses are dissected in the Evaluating category, going through theories, discussions, methodology and findings of the scientific resources included in the review.

Often new and original research questions are born from previously unknown gaps in the literature itself: the scholar applies the final category Creating to develop non-expected connections.

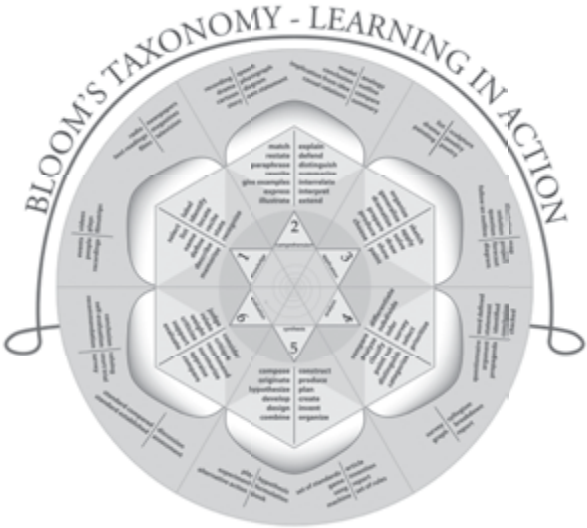

Fig. 1 - "Bloom's rose" by K. Aainsqatsi - Own work. Licensed under CC BY-SA 3.0 via Wikimedia Commons -http://commons.wikimedia.org/wiki/File:Blooms_rose.svg#mediaviewer/File:Blooms_rose.svg

Fig. 2 - "Bloom's CognitiveDomain" by Nesbit (converted by King of Hearts into SVG) - Image:BloomsCognitiveDomain.PNG. Licensed under Public Domain via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:BloomsCognitiveDomain.svg#mediaviewer/File:BloomsCognitiveDomain.svg

Applying the aforementioned categories of Bloom's revised taxonomy of the cognitive domain, the researcher generates value for the research outcomes with the literature review[2].

Case Studies

In the empirical studies a case study (or case report) is a research method involving a detailed investigation of a single or several cases in the field of interest: case study may be prospective, establishing criteria and cases fitting the criteria as they become available; or can be retrospective, criteria are established for selecting cases from historical records for inclusion in the study. The case study is studied holistically by one or more methods. Case studies should be characterized as a research strategy, whose aim is to study an issue or circumstance in its actual and realistic situation. Quantitative evidences coming from multiple sources can be comprised in a case study; in general a case study is not qualitative research, as it contains both findings coming from quantitative and qualitative data.

Case studies are usually gathered in three categories:

- *Key cases*
- *Outlier cases*
- *Local Knowledge cases*

The researcher has to choose to analyse in depth a single case study or multiple case studies, also characterizing it as a snapshot case study, a retrospective case study or diachronic case study. Generally the case study analysis process follows these steps: firstly in the evaluative or exploratory phase the scholar identifies the purpose of the case study. Secondly, the scholar defines the foreseen methodology to be used, choosing between theory-testing, theory-building or illustration of the case study. The typology offers many permutations for case study structure. The possibility to generalise the case study is very important in applying such method. If a case study is particularly relevant to the scientific problem confronted by the research, it is defined as critical case study. The case study is also effective for generalizing as part of critical reflexivity process suggested by the K.Popper's Falsification Test. It shows that if just one observation does not fit with the proposition it is considered not valid generally and it must be reconsidered or excluded by the selection[3].

Best Practices

A best practice is a method or technique that is used as a benchmark. Best practices are used for quality management, can be established on benchmarking or self-assessment; both management standards ISO 9000 – Quality management and ISO 14001 – Environmental Management have best practices within their features and components.

Self-assessment[4] is the process of looking at oneself in order to assess requirements that are important to one's activity as parte of a defined process. It is one of the motives that drive self-evaluation, along with self-verification and self-enhancement in the organisations accordingly with ISO 9000 basic principles.

The benchmark method[5] is the process of collecting, analysing and relating performance data of comparable activities with the purpose of evaluating and comparing performance between or within entities. It can be standardised as it is for example in the energy management by the mean of CEI UNI EN 16231:2012 Energy efficiency benchmarking method. It defines the minimum requirements for energy efficiency benchmarking, the benchmarking steps, the purpose and planning, how to execute data collection and verification, the analysis and results management, the final reporting, the monitoring and actions.

- Purpose and planning: define the objectives for the benchmarking, including definition and select the approach and type of benchmarking, produce a project plan and assign resources.
- Data collection and verification: agree on data collection method, collect and verify data and collate the findings to enable analysis.
- Analysis and results: assess current performance levels, produce tables, charts and graphs to support analysis and seek explanations for the differences in performance.
- Reporting: communicate results including lessons learned.
- Monitoring and actions: can be adopted in accordance with management systems in the organisation - implement specific actions, monitor progress and implement specific actions including those from lessons learned.

Best practices can evolve as improvements are found. Best practice is considered by some as a business driven study methods used to describe the process of developing and following a standard way of doing things that multiple organizations can use.

There are some criticisms on the term best practice: some author (E. Bardach, 2011) claims that infrequently the analysed practices are the best ones, time and again the practices can be defined as good or smart. It can be also found the lemma contextual practice for such a reason. In particular smart practices are associated with the sustainability concepts.

The most common used tools to analyse best practices are questionnaires to collect data, and checklists with proper correction factors to analyse data sets.

Data Analysis

Analysis of data is a process for data selection or creation, structuring, modification and modeling with the aim of creating useful information, draw conclusions, and supporting decision-making[6].Various techniques, aspects and approaches are the base for the development of data analysis in countless domains of possible application.

Data mining is a particular data analysis technique that focuses on modeling and knowledge discovery for predictive rather than purely descriptive purposes. This is considered a sub-field of computer science aimed to analyse the whole data processing characteristics and results since collection, extraction to analysis and reporting. Business intelligence covers data analysis that relies heavily on aggregation, focusing on business information like for example OLAP (On-Line Analytical Processing).

In statistical applications, some authors divide data analysis into descriptive statistics, exploratory data analysis (EDA), and confirmatory data analysis (CDA). EDA, encompassing IDA (Initial Data Analysis) methods which analyses narrowest slice of data available universe which is selected by specific criteria, it is centred on finding new attributes in the analysed data and CDA is aimed to verify the validity of already made hypotheses.

Predictive analytics focuses applying statistical models to develop forecasts and classifications; text analysis instead relies on structural, linguistic and statistical methodologies to take out information and classify it from the non-structured data originated by text resources.

All are varieties of data analysis. The term data analysis is sometimes used as a synonym for data modeling. On the contrary as to be observed that it is more correct to associate it with the Intelligence Cycle related to the creation of finalised information.

The evolution of data analysis tools using software art-facts called data bases management systems (DBMS) gone very fast since 70ies when personal computing has been risen. An effective representation of such evolution since the initial raw tool simply able to store, those allowing data ranking, to early procedural data bases until today relational ones based on open entity-relationship model can be found in literature. Figure 3 shows the so call intelligence process (or loop) which allows data to useful information transformation. Figure 4 represents the today three levels information modeling which is based on typical relational data base management.

More properly the term modeling (see following paragraph) can be used to describe the activity to represent activity in organisation. As shown in the figure the modeling levels are generally three: the conceptual level, the logical level and the physical level because to modeling follows artifact which consists of software tools.

Modeling is supposed to support business opportunities, increasing effectiveness, decreasing risks and costs. It supports systems integration adopting simple interfaces, abolishing o reducing at minimum redundancy, making all data compatible.

Construction Industry adopted similar approach using BIM (Building Information Modeling). This is a transitional modeling tool supporting basic sharing information requirement within the project team. The BIM modeling is based on conventional LOD (Level Of Definition) of the information that allows the project standard platform.

Research Outcomes Analysis

Research Outcomes Analysis is not to be intended as a method itself but more properly as a common practice when research outcomes in the studied domain are available. Generally it consists in comparing and discussing outcomes to validate or falsify the results. It can be conducted in a variety of ways by several methods on the base of the type of results (i.e. qualitative or quantitative) to be analysed.

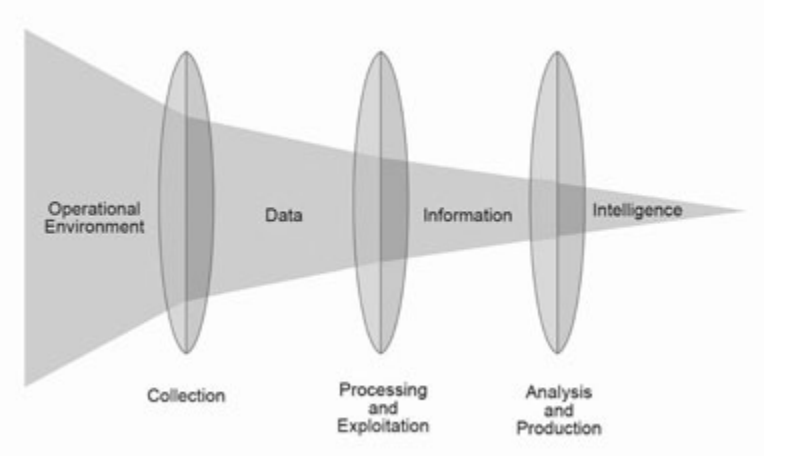

Fig.3- The relationship between data, information and intelligence by U.S. Joint Chiefs of Staff JP2-0 (source: http://www.dtic.mil/doctrine/new_pubs/jp2_0.pdf

Document Review

Document review is the process whereby one reads and analyses non-scientific documents (i.e. standards, regulatory framework and norms) and data related to the research domain. The term is derived from the work performed by attorneys for their clients; it is used to determine which are sensitive or otherwise relevant to the case. It is the preceding phase of a literature search to start the literature review (see above). It can be one step, when analysing norms and regulatory documents for procedural purposes.

In scholarly research it can be applied to research reports and guidelines of the studied domain.

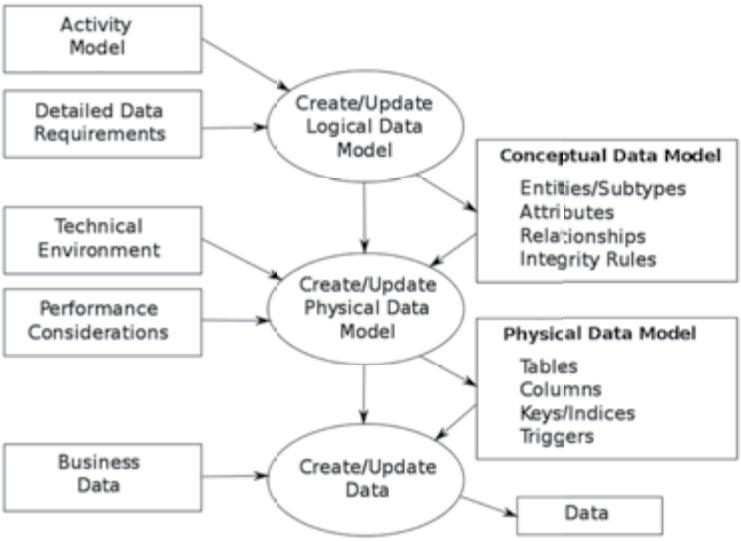

Fig.4- Data Modelling Today by 4-3_Data_Modelling_Today.jpg: Matthew West and Julian Fowlerderivative work: Razorbliss (talk) - Developing High Quality Data Models. The European Process Industries STEP Technical Liaison Executive (EPISTLE).4-3_Data_Modelling_Today.jpg. Licensed under CC BY-SA 3.0 via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:4-3_Data_Modelling_Today.svg#/media/File:4-3_Data_Modelling_Today.svg

Workshop, Focus Group, Round Tables

Historically workshops were the only places of production until the advent of industrialization and the development of larger factories; the term workshop is used in a translated meaning in Architecture: it may be a session set which provides both the context and tools (or machinery) that may be required for the design of projects. In the Architecture practice they simulate in a small time scale the design process or part of it. These techniques belong to the qualitative set of methodologies and tools. It is at the some time combined with other qualitative techniques like focus groups and round tables.

A high level of inter-disciplinary and multi-disciplinary collaboration, along with inventiveness can be observed in focus group research outcomes since its origins. In addition, it can be noticed how the group composition and format varies according to the research field and type of research question that is at the core of research itself.

On the one hand the advantages of focus groups can be listed as: quick and relatively cheap; possibility to interact directly with respondents; opportunities to gain extensive and meaningful data; creation of synergy between the participants that can lead to further development; organizational flexibility; data obtainable both from expert and non-expert audience; friendly and inclusive environment.

On the other hand, the method also shows some limitation because of: small number of respondents; it can possibly lead to unforeseen and non-desirable interactions between the participants; lack of statistical summary; interpretation difficulties coming from open-end questions made during the focus group; bad bias on the outcomes. There is also another very useful qualitative tool in the researchers toolbox like round table. Understanding the strengths and weaknesses of discussion is extremely important, since they produce very specific data types. These data is extremely meaningful and rich in content, in addition to being limited and diagnostic regarding the situation of the focus group.

The buildings steps for this method in particular are: definition of the problem; identification of sample frame; identification of moderator; interview guide; sample recruitment; analysis of data (see above); group conduction; report write-up; decision making and action. The number of participants should be comprehended between six and twelve people.

Fewer than 6 participants may originate a scarcely bright or boring discussion. More than twelve participants are hard to manage. Focus group research is able to generate very powerful outcomes, but cannot substitute by itself all the other research methodologies[7].

Triangulation

It combines method designed to analyse a problem from different viewpoints. It is used both in quantitative and qualitative research as well. Most common is the application in filed measurements: it get a fix point on its true location. In social science interpretation it is applied looking at phenomenon from different assumptions. In generally it occurs when researchers studies are confronting different theoretical positions. It also can be used to differently interpreting data to the aim to generate meaningful information to the research topic[8].

Research Paths

Better than a method it is a classification of it in linear or not linear path to do a sequence of research activities (or research development process). Quantitative research is more adopting linear path because of fixed sequences use. On the other hand qualitative research use more non linear and cyclical path that makes step by step, feedback and sideways moving on attempting the expected goals. Project design assumed as research process can be classified as such.

Bricolage

Qualitative researchers are often very creative in adapting whatever they have available to support their aims of study. The bricolage or DIY (Do It Yourself) can be made very sophisticated and it depends by the researchers skills: it mean working one's hands, using in an creative manner already existent tools, materials, data whatever to accomplish the tasks. It is very much used in industrial design research: it can produce a prototype and it today supported by 3D printers.

Research Internship and collaboration

Internship is job training for high professional careers. Internship for academic careers is similar in some ways to apprenticeships for jobs. Since there are no standards and overlook above the young researchers experiences the term "internship" can assume many different meanings[9] . Interns, both in industry and academic institutions as well, may be post-graduate or PhD candidates. Internship positions can be salaried or not and generally are bound to short-term (three to twelve months) contracts and developed by a plan related to the research aims. Research internship and collaboration are to be considered a way to acquire direct experience about methods and tools that are considered useful in the research domain. These cannot be classified as a method itself. Research internship or dissertation internship are usually undertaken in Italy by second year PhD candidates (at least 3-6 months duration), sometimes doing research activities for a particular company, institution or organization. On the one hand the student can be in the position of choosing a topic of interest within the organization activities or – on the other hand – the company can propose to the student a particular research framework to enhance some of its assets through joint research and development. Usually the outcomes and final results of these research activities are synthetized in a formal report and presented both to PhD and company advisors at the end of the internship.

It has been more and more frequent for skilled researchers to experiment a virtual internship by working in remote for an organisation.

Field Experience

Field experience is a real world operation related to the research domain. It is based on the operation project in the research framework. Generally the field experience allows data gathering or results validation. Thus the field experience can be planned in different stages of the research development. Field experience can also be an operational application of outputs. It cannot be considered as a unique methodology but like as a wide set of methods and tools that make it operational.

Testing of Methods and/or tools

The term comes from Software testing. Methodology testing is used to give information regarding product or service quality to interested stakeholders or project participants; this usually generates a detached and equitable point of view over the methodology or tool, allowing to evaluate the risks and threats connected to the tested method. Debugging through runs is a common practice included in testing of methodologies, it comprehends the repeated use of a methodology sub-process to evaluate it and find possible criticalities in determined situations. Methodology testing allows to understand if the method meets the initial requirements that lead its development, if it is responding to the proper inputs, if it respects the given time schedule and if it is easily usable and replicable in the intended context. Also, the possibility to generalize the methodology is a very important subject of testing, since it can draw the attention of additional potential stakeholders.

In the other uses of the methodology the object to be tested can also be a procedure, an activity process, a product, a project design etc.

In field Measures

In field measures is a campaign to gather data. It is a quantitative method very much used in engineering and generally it is supported by instruments. In field measure can be conducted at various scales also in a remote way both from space and on the ground as well. In field measures created data sets to be analysed by disciplinary approaches using proper analytical methods and tools (see above) of a specific domain.

Calculation

Calculation is the elaboration process of data sets using proper algorithms that transforms one or more inputs into one or more results in relation to the research domain and aims. Research calculation may require specialised software for data modeling or to wright new software routine containing innovative models and algorithms. The term is used in a variety of senses, from the very definite arithmetical calculation, to the vague heuristics of calculating a strategy in a competition or calculating the chance of a successful relationship. Statistical estimations of results from opinions (see Focus Group) also involve algorithmic calculations, but produces ranges of possibilities rather than exact answers. To calculate means to verify by computing[10].

Simulation and Modeling

Simulation is the imitation of the operations of a real-like system or process observed over time. Developing a simulation model is the first step to be undertaken before setting up the simulation environment. The model entangles the main features, behaviours and characteristics of the examined system or process. The model is generally a simplified or abstract representation of the system itself. The simulation step represents its operation from t_0 – beginning time of the observation – to t_e – concluding moment of the simulation run.

Simulations are really useful to understand the consequences of the variation of the corollary conditions that are reflected on the object of examination; in addition, a simulation can be run when the actual (real) system or methodology is not ready yet to be properly tested or even does not exist at all[11].

The activity of developing the simplified or abstract model of the examined object – i.e. Modeling – aims to render in an easier, quantifiable, defined, understandable and visual way a complex problem, event or process. Important and meaningful features of the real situation have to be carefully chosen by the researcher. Distinct aims mean different models to be developed, ranging from mathematical to operational models, from conceptual to graphic and abstract models to give a representation of the subject. Many scientific disciplines have their own ideas about specific types of modeling. Architecture, Engineering and Industrial products Design as well widely use modeling for many purposes. Brunelleschi project design process to build Santa Maria del Fiore's dome was a combination of modeling techniques that have involved both geometry abstraction and material shaping.

In the recent years systems theory and knowledge representation are a trending topic within scientific modeling, system theory an increasing number of methodologies and techniques to give a proper representation of the most different phenomena and processes[12].

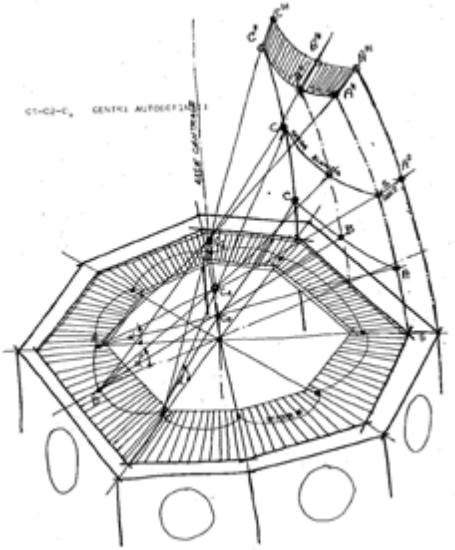

Fig. 5 - Model of the Santa Maria del Fiore Dome, Firenze (Source: Ricci, Massimo (1983). Il fiore di Santa Maria del Fiore. Ipotesi sulla regola di costruzione della cupola, Firenze, Alinea Editrice)

Aims and conclusions of this paper

In opinion expressed by some authors[13], it has been pointed out the importance of the multidimensional assessment of scholarly methods which can be combined in a proper methodology. It is shown the relevance of a clear methodology adopted both for research development and evaluation as well. This paper's notes have risen by the discussion made within the PhD candidates in Florence, in occasione of the 10th Doctorates Seminar, and further developed within the PhD candidates group working at the Architettura PhD Program at the Università degli Studi di Firenze[14].

These are an example of adopting different methodologies in our domain of disciplines.

Fig. 6 - Distribution of Methodologies in the scholarly research sample.

Further discussion on methodologies for scholarly research process effectiveness and quality seems to be conducted. In fact one can agree that a robust scholarly research process is based on a clear methodology and tools set. Several methods are combined in a scholarly research and these have to be properly selected, structured, verified and discussed and reported. To this regard researchers have to be trained on that side. The question to be answered is: how to teach methods selection and creation by the research process? Sometimes, observing the sampled scholarly researches, one can receive the impression that the methodology combination set and the related tools seem to be sound and supporting outstanding results or weak and showing a lack of effectiveness. It can be suggested to systematically present such matter during the PhD Program itself. Deepening in selection and design for the specific research application could be a good investment in planning scholarly research work. The proposal could be introducing further training and experience on the subject for PhD candidates, for example participating to scholarly researches evaluation sessions where these can be systematically analysed in this regard.

In conclusion this paper has presented a set of methods observed in the current PhD research practice within our domain. Sometimes

these are adopted spontaneously by the researcher without a specific training on the subject. It can be noted in the scholarly research sample that some of the activities indicated as methods are not, on the contrary, possible to classify as methodology. This can be an element to be better clarified during early stages of the research and surely before to submit the research proposal. The emerging relevance of the research evaluation point out the research development process in a different way. The competition for the scarce resources focuses on accountability of products also derived by the scholarly research process quality. One of the most accountable aspects is a robust end effective methodology. This belongs to the research project planning, but it is dynamic, because it can be adapted to the development process and results. Finally the ability to select or define proper research methods and tools it is a peculiar aspect of researchers skills. This paper's contribution, not attempting to be systematic or complete, offers an example of how to refer this topic to the set of disciplines within the Product Design, Engineering and Architectural Technology domain and start a discussion on a systematic doctoral training improvement.

Notes

1. The discussion has been started in occasion of the 10° OSDOT2.0(X) Seminar 2014, Firenze.
2. http://en.wikipedia.org/wiki/Literature_review
3. http://en.wikipedia.org/wiki/Case_study
4. http://en.wikipedia.org/wiki/Self-assessment
5. http://en.wikipedia.org/wiki/Best_practice
6. http://en.wikipedia.org/wiki/Data_analysis
7. http://qualitative.wikidot.com/focus-groups-theory-and-practice-mr-jitipol
8. http://qualitative.wikidot.com/research-design
9. http://en.wikipedia.org/wiki/Internship
10. http://en.wikipedia.org/wiki/Calculation
11. http://en.wikipedia.org/wiki/Simulation
12. http://en.wikipedia.org/wiki/Scientific_modeling
13. Reference: the 2010 Expert Group on the Assessment of University-Based Research, installed by the European Commission, that published a report introducing the concept of a multi-dimensional research assessment matrix http://www.altmetric.com/researchers.php

14. Elena Bellini, Gisella Calcagno, Gianluca Darvo, Roberta Faga (XXX Programme's Cycle of the Dottorato in Architettura, Curriculum in Tecnologia dell'Architettura)

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