MANAGING MULTI-ARCHITECT COLLABORATIVE DESIGN CONCEPTION

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Abstract  
This paper describes a PhD research on design management that addresses the collaborative design conception by multiple top architects in large and complex building projects. The research studies four actual cases in the Netherlands, namely De Resident in The Hague, Nieuw Stadshart in Almere, Oosterdokseiland and Mahler4 in Amsterdam. The research finds that current project management on design employs a variety of methods and instruments to coordinate the tasks and information, and optimises the programme and outcomes; but leaves out the idea generation as the ‘black box activity’ by the designers. As close collaboration in design conception has become a necessity, more interaction between the designers’ creative processes is essential. To fill in the knowledge gap, the research develops a new framework centred at social-psychological approach to initiate and guide collective designing. The framework establishes the common ground between design and management, and proposes that managing multi-architect collaborative designing requires the managers to design the cognitive, social, and project frames of the architects. The framework is based on multidisciplinary scientific foundation and seeks to integrate the human approach to the existing systematic-rational project management approach. The potential practical implications of the new framework are illustrated through case studies. The scientific quality of the research is to be assessed using the measures applied for research associated with design, i.e. credibility, transferability, dependability, and confirmability. The research findings are to be practically validated using a large case study.

Keywords: Complex project, design conception, design management, framework, multi-architect collaboration.

INTRODUCTION  
This paper describes PhD research that focuses on the collaboration between multiple top architects during the design conception. Design conception is a crucial activity that marks the beginning of urban and architectural design process. It is relatively short compared to the total project course, but it is very important to lay down the principal design concepts and decisions for the whole project. In design conception, the architects play the key role in direct consultation with the stakeholders and other specialists. Multi-architect collaborative design conception has recently become a trend around the globe as many high-profile design teams have emerged to take on large and complex architectural projects. Yang (2004) states that singular glory is a thing of the past; architectural firms, big and small, young and established, independent and corporate, are collaborating to create new design models, in project and in practice. This has consequently raised an urgent need for an innovative design management approach.

Design management has become one of the key factors to innovate the disciplines or urban and architectural design, but is a relatively new knowledge field in architecture. Current approaches are fragmented and largely experimental and literature on managing
multi-architect collaborative design conception is scarce. Hitherto the understanding about the essence of the problem and the way to tackle it is very limited, thus research on this subject is timely and important for both professionals and academics.

This research aims at providing the building professionals in charge of supervising and leading the design team with the insight into the real situation and core problem, and enabling them to take innovative and rigorous approach for managing multi-architect collaborative design conception. The final deliverable of this research is a new conceptual framework which features a new paradigm, innovative design management activities, and examples of the potential implication. In general, a framework clarifies the fundamental understanding and the general point of reference and can be distinguished from a tool or guideline. These are necessary to prepare more detailed sets of instruments and lists of recommendations to be applied on specific situations. The new framework is expected to provide the professionals with clarification, comprehensive understanding, new perspectives, and new mindset towards the real-world situation. To achieve the general aim, this research has three interrelated objectives to be translated into research steps. The first objective is to carry out an empirical study to describe the real practice and to identify the problem and the knowledge gap. The second is to fill in the knowledge gap by introducing new paradigm and conceptual framework for managing multi-architect design conception. This is achieved after consolidating the existing knowledge of design management in architecture and transferring relevant knowledge and best practices from the other disciplines. The third objective is to indicate how the framework—which fills in the knowledge gap—can be coherently linked to the existing design management approaches, and to illustrate the potential practical implications of the new framework.

The practice of multi-architect collaborative design conception is complex and comprises many interdependent issues and factors, which cannot be isolated or understood separately. Therefore, this research needs to adopt a comprehensive and holistic approach. As qualitative research, it examines the phenomenon of collaborative design conception in its actual setting and the meaning people bring to it. It stresses the socially constructed nature of reality and uses constructivist as its interpretive paradigm. It generates knowledge based on different personal reconstructions of the phenomenon. The researcher’s voice is that of a ‘passionate participant’ actively engaged in facilitating people’s interpretations of the phenomenon from multiple perspectives (Denzin et al, 2000; Miles et al, 1994).

CASE STUDIES AND PROBLEM ANALYSIS
The empirical study for exploration and description is carried out by studying four recent cases of multi-architect project in the Netherlands, namely: De Resident in The Hague, Nieuw Stadshart in Almere, Mahler4 and Oosterdokseiland in Amsterdam (Sebastian, 2003a). Various top architects have worked on the design of the projects, e.g. Michael Graves, Cesar Pelli, Rob Krier, Sjoerd Soeters, Rem Koolhaas, Christian de Portzampare, Rafael Vinoly, Toyo Ito, Jo Coenen, Erick van Egeraat, and Frits van Dongen. The projects are considered as ultimately relevant cases for research on design management in architecture. Since these projects are at the highest level of significance and complexity, they may address various issues and difficulties related to collaborative designing. The analyses and conclusions of the research on these projects would serve as valuable lesson
for other projects. Besides, these projects match the PhD candidate’s professional experience, personal interest, knowledge, and network that support the data collection and analysis. The empirical research uses cross-case analysis over the project content and the design process, the real complexity and the reference to complexity theories, and the existing attempts to manage collaborative design conception. The empirical research concludes the unique characteristics of multi-architect collaborative design conception, its essence and main aspects for design management, the current knowledge gap which calls for innovation, and the outline criteria for the new design management framework.

This research finds the unique characteristic of multi-architect collaborative design conception in the fact that the creative idea generation is not carried out individually, but takes a great deal of interaction between multiple architects, supported by multidisciplinary specialists, in the design team. Individual designs are enhanced in team discussions. The total design is achieved through consensus and teamwork, rather than combining individually developed design solutions. A multi-architect project is usually driven by the high ambition for realising rich architectural composition as well as the political and market demands for the high-profile urban projects. This research also finds that multi-architect collaborative design conception has to face multidimensional complexity. The technical complexity is due to the large scale, function mix, large investment, long period, sub-project interference, and low failure tolerance. The social complexity is due to the large number of participants, broad social importance of buildings, and close collaboration of designers. The design complexity is due to the unique nature of design problems, solutions, and actors. While the construction engineering excels in offering technical solutions, the social complexity has been escalating on the top of the technical one and significantly influences the design complexity.

The empirical research recognises that any attempt to manage design has to deal with three main aspects: design people, processes, and products, so-called the 3Ps. The research on multi-architect collaborative design conception considers design people as the architects, design processes as the creative activities performed by the architects, and design products as the creative solutions resulted from the ideas raised and elaborated by the architects. Other researchers also address the 3P aspects. Buchanan (2001) sees design as shaping the values and responsibilities, the world of actions, and the subjects. Otter and Prins (2001) consider that design has the constituent elements of people, processes, and objects. Hoskin (2004) mentioned that management could be viewed as organisation structure, process, and content. Regarding creativity, Badke-Schaub (2005) refers to the capabilities of the designers, to the process of designing, and to the outcomes.

The empirical research goes further to investigate how the current management practice deals with these 3P aspects. Traditionally, the design requirements for a large and complex urban project are divided into several design briefs for different architects, each containing specific project parts and design problems to be solved. Each architect is assigned to work on his design brief in accordance to the rigid design guidelines. He then creates the partial design at his own design firm. Afterwards, the partial design solutions are put together on the previously designed master plan while the integral technical solutions are developed. The ‘traditional’ project management on design conception
focuses on the process and product aspects: management of the process by coordinating and facilitating tasks, information, and decision-making; and management on the products by optimising design programme and requirements, and integrating architectural and technical solutions.

This research observes that current project management practice concentrates on facilitating and supporting the design processes and products, but fails to attend to the designers in conceiving the design ideas. Current project management practice supplies the information, coordinates the tasks, and controls the outcomes, but regards the designer’s creativity as a ‘black box’ for management. This is the current gap in practice.

As close collaboration between the designers is currently expected, more interaction between individual ‘black boxes’ has become essential. Complex problems can only be dealt with by a design group using different perspectives. Total harmony cannot simply be achieved by merging partial outputs at the end, but only by synthesising during the creative activity. Designers are engaged in dynamic consensus of competing values and cross-functional synthesis of various individual interpretations. There are few management attempts on the collective idea generation, but these are rather spontaneous based on the initiative and experience of some design leaders and not rigorous in their approach. Innovative approach of design management is needed to fill in the gap by managing the people aspect in multi-architect collaborative design conception.

A further look at the people aspect reveals the interplay of three working frames: the cognitive frame, social frame, and project frame (Badke-Schaub, 2005). On one hand, the development of design solution is considered as a unique cognitive part of the problem solving process, requiring methods of enlarging and limiting the search area. On the other hand, solution search is seen as a social process in the context of collaboration and communication, where group structure and group climate play an important role to achieve the desired synergy effects. The social process also implies the co-operative behaviour, which might also take account of the relationships between conscious and unconscious aspects of behaviour in the design team. In practice, as the designers come together to carry out a real building project, they work in the so-called project frame with actual project goals, visions, constraints, operations, and deliverables. The cognitive, social, and project frames do not pre-exist, cannot be standardised, and have to be customised to meet the project content and the characteristics of the project participants and organisations.

The empirical research also indicates the criteria of the framework needed for managing multi-architect collaborative design conception. First, the framework should be appropriate for large and complex architectural projects, which are fundamentally different from the small and simple ones. Second, the framework should not be a generic one, but should be customisable to fit different projects and situations. Third, the framework should fill in the gap by addressing the people aspect. It should integrate human approach in design management with the technical-rational approach in project management. Fourth and last, the framework should view design management as a participative role in designing rather than an authoritative function in the project.
structure. Design management should be exercised in consultative rather than instructive way. In this capacity, it acts more as a peer rather than a superior.

LITERATURE REVIEW
State-of-the-art of design management literature in architecture was reviewed and relevant theories and best practices also sought from other disciplines. The literature research categorises the state-of-the-art of design management in architecture into several approaches, namely: engineering-instrumental approach, design-methodological approach, value-performance-and-quality measure approach, systematic decision-making approach, and organisational-protocol approach. The preceding paper by Sebastian (2004) reviews the work of Colin Gray, Stephen Emmitt, Matthijs Prins, Glenn Ballard, Laurie Koskela, Teake de Jong, Peter-Paul van Loon, Kerry London, Alijd van Doorn, and Gebhart Friedl.

The engineering-instrumental approach mainly considers a design process as a rational problem solving mechanism. It includes methods, tools, and techniques to coordinate design tasks and information. It has three dimensions: programming facilities, constructional issues, and inter-agency coordination. It employs the systems thinking to take out the parts, which can be well defined, and solve them separately. It extends to modelling of the multidisciplinary building design process as well as (re)designing the process. The design-methodological approach believes that certain design protocols facilitating empirical and logical knowledge can guide the design activities. It sees various design processes as an interplay of several methods, and provides transparent and systematically structured encyclopaedia of scholarly methods to assist an individual architect to access and point out methodological components during his design study or research.

The value, performance, and quality measure approach asserts that the most important mission of design is to produce objects that are able to meet the aesthetic and functional expectations in use, as well as the economical and technical requirements in production. Some research emphasises the role of design management for value creation for the stakeholders and project participants, while other research concentrates on the achievement of building quality especially in terms of architectural technology. The systematic decision-making approach investigates ways to optimise the design decision-making process using mathematical calculations for quantification of design decisions. This approach aims at complex multi-actor decision-making processes by measuring the alternative solutions against the parameters assigned on the parties’ requirements and influencing conditions. The organisational-protocol approach deals with the management of design office and the relationship between an architectural firm and the other building parties. The office management runs the organisation, directs the design production line, leads the office and project administration, and supervises the contractual relationships with other parties. The management of inter-organisational relationship applies on design briefing and design contract management.

Critical appraisal of these approaches finds that the state-of-the-art of design management in architecture has not penetrated the core of multi-architect collaborative design conception, which is the interactive and collective idea generation. The existing research
emphasises the design processes and products. The people aspect is addressed in formal, structured, and systematic ways, which are indirect to the creative activity by the designers. Thus, the same knowledge gap as in the practice seems to appear also in the academic world of architecture.

In order to fill in the knowledge gap, the literature research looks for relevant theories from other disciplines. These theories should address the cognitive, social, and project frames of the designers in collaborative design conception. The research goes over the theories from thinking to action, and from individuals to groups. It covers the description of the architect’s thinking, the personal and organisational knowledge, the group behaviour and creativity, and the reflective practice. The preceding paper by Sebastian (2003b) reviews the work of Donald Schön, Ronald Hamel, Omer Akin, Ikujiro Nonaka, Michael Polanyi, Laurie Mullins, Christopher Barlow, Helga Hohn, Rianne Valkenburg, and Isabelle Reymen.

Hamel observes a number of experienced architects at work and describes their thinking process in a cognitive-psychological model. His model proves that what seems to be creative coincidence during the design process is not necessarily a sign of randomness or chaos. The components of such creative process actually relate and interact with each other in certain ways. These are strongly associated with personal experience and subjective judgment in perceiving, reframing, and analysing the problems, as well as synthesising and shaping the design solutions. From Hamel’s research, design management can learn to recognise such cognitive process in order to channel the cognitive patterns of multiple architects in collaborative design conception. Nonaka et al. discuss the personal and organisational knowledge creation. An important knowledge dimension is the tacit knowledge, defined by Polanyi as person-attached knowledge, which can be understood by its being-in-use and can be learned by its being-performed. By this, design management is reminded to pay attention both to the explicit knowledge which can be transferred to the design team through documents and protocols, as well as to the tacit knowledge which can only be shared through social interaction and coaching.

A great deal of research has been done on group dynamics that studies the behaviour of people as they interact within the organisational setting. Concerning the group creativity, Barlow presents a deliberate insight model which describes the creativity in a group as an insight shift—which is often triggered by the idea of the other group members—towards the better understanding of the problem and solution. Being aware of the importance of the insight shift in a group, design management can learn from Hohn’s research about combining generative and focusing modes of leadership for creative teamwork. Schön explains how a designer learns from knowing-in-action and works through reflection-in-action. Designing is a reflective conversation when the designer shapes the situation in accordance to his initial appreciation of it, the situation ‘talks back’, and the designer responds to its ‘back-talk’. Akin supports this by saying that the deterministic relationship that exists between the problem description and its solution is dialectic one. Valkenburg extends this by stating that the designers in a creative group can also reflect on each other’s thinking and working process in the so-called reflection-in-collaboration. For design management, reflective practice is essential because it provides the way to place the design cognition and knowledge into the actions by individuals and groups. Design
management can make use of some methods, such as reflective practicum, structured reflection in design session, and reflective design teamwork.

NEW PARADIGM AND CONCEPTUAL FRAMEWORK
A common ground and joint scientific paradigm between design and management are essential to develop design management. As long as people perceive design and management standing on two poles apart, it is impossible to build on design management. This research seeks to present the interface between design and management. Allinson (1997) and Tunstall (2000) have attempted to bring project management methods and techniques to the architects for more effective design process. This research goes deeper to examine whether the two activities fundamentally have shared nature; to prove that management can find its nature in design and vice versa. It draws upon some aspects of the work of Vitruvius, Peter Drucker, Herbert Simon, John Christopher Jones, Thomas Kuhn, Louis Bucciarelli, and Richard Buchanan.

Design and management are knowledge intensive human activities, which work with and within uncertain situations, to deliberately initiate and devise creative processes for shaping more desirable reality (Sebastian, 2005a). Within this term of reference, one should understand that design management is not only problem solving, but also problem-finding. It is not the steering of activities and resources towards the static, pre-defined goals or requirements, but the critical examination and reformulation of both the requirements and solutions. It is not the attempt to find a single best solution (since there is probably no single best solution in design), but the reflection that the searching itself could be most important. It is not the one-way journey of making decisions to narrow down the possibilities on the course of the project, but the iterative process to continuously review and refine the possibilities. Furthermore, with respect to the people aspect, and in relation to the cognitive, social, and project frames of the designers; managing multi-architect collaborative design conception finds its scientific paradigm in the social sciences. Bucciarelli and Drucker stress that design and management are social processes. Both in practice and science there is a shift to human approach. All four cases show the evidence of the significance of the social interaction, respect, trust, and commitment in the design group, and the charismatic leadership by the architect supervisors. In science philosophy, there is ‘an evolution’ from systematic-rational to social-reflective paradigm. There is a revival of the human factor, with its unique cognitive facilities, as the focal point in design and management. Buchanan (2001) notes this as a fundamental shift in the intellectual arts that we employ to explore design in practice and research. The early theories of design found expression in grammars and logics of design thinking, but the new ones find expression in rhetoric and dialectic.

Based on these findings, this research introduces three propositions of the new framework for managing multi-architect collaborative design conception. First, managing resembles designing, if the two activities are interpreted as human practices. Design must be seen broader than creating buildings or artefacts; design product can be about anything, e.g. organisation, process, communication, or service. Second, managing contains the art of designing, as design attitude and thinking are essential for managers. Designing and managing are inescapably intertwined, so bringing the art of design into the practice of management is important. Design thinking and design attitude are crucially important for
managers, but remain overlooked in much management practice and science. Design thinking is believed to be very useful if it is applied to a widening circle of human problems that are no longer adequately addressed by traditional methods and practices. Design attitude views each project as an opportunity for invention that includes a questioning of basic assumptions and priority for innovation (Boland, 2004).

The third proposition figures a manager as someone with design competence who actually performs designing; or in other words, managing-by-designing. This is in line with Simon (1969) and Schön (1983) who see a manager as a form-giver who shapes organisations and economic processes. In a certain situation, a manager is like a technician whose practice consists of applying principles and methods derived from management science to solve organisational problems. In another situation, a manager is expected to be like a craftsman, a designer, and a practitioner of art-of-managing that cannot be reduced only to explicit rules.

Managing works through designing, as the managers are expected to design new cognitive, social, and project frames to encourage the interaction between individual ‘black boxes’ to allow one’s creativity to be stimulated and enhanced by other members of the design team. Managing by designing the cognitive frame means developing and configuring heuristic devices to stimulate and facilitate the generation of innovative ideas. Managing by designing the social frame means creating the environment which fosters positive group behaviour for collective creativity. Managing by designing the project frame deals with the goals, visions, constraints, resources, and outcomes of a real architectural project on which the design team is working.

The framework elaborates certain ‘design activities’ by the manager. Designing the cognitive frame can be carried out, for instance, by diagramming and sketching to enhance design and management cognition; developing and composing meta-models, metaphors, and analogies to engage shared understanding; and activating expert intuitive judgement to support design decision-making. Designing the social frame can be done, for example, by setting up design studio-like working environment; team building for architects; and assuring dedicated and highly motivated effort. Designing the project frame could comprise such activities as reinventing goal and vision; re-construing and reframing constraints; and shaping and synthesising solutions.

ILLUSTRATION OF POTENTIAL PRACTICAL IMPLICATIONS
This research demonstrates the potential implication of the new framework through several real situations in the case projects. It finds that a few experienced professionals have exercised some innovative approaches in the framework. However, the application takes place rather spontaneously, unconsciously, irregularly, and incompletely. This research describes how the rigorous application of the framework could bring significant improvement. It illustrates the coherent application of human and engineering approaches depending to the characteristics of the project and participants. An example of managing by designing the cognitive frame can be found in the Oosterdokseiland project. Usually, sketches are used by the architect to describe his interpretation of the client’s requirement. In Oosterdokseiland, sketches are also used by the manager to design the programme in this project to explore, set-up, and elaborate the references and requirements. As a
building designer, the PhD candidate has sat down with the manager of the client organisation to sketch all project strategies and prepare the design programme. One of the architects, Jo Coenen, says that by doing sketching together with the client, both parties can try to understand the expectations and possibilities better.

Another example related to designing the cognitive frame is found in the design workshop, as the creative “ahah!” can be triggered by ideas from diverse people. For instance, the support staffs that are looking at the problems from different –yet complimentary– perspectives can spark the ingenuity of the architects. To encourage all participants to understand the design ideas and actively contribute to the discussion, broad vocabulary and means of representations are needed. In the Nieuw Stadshart project in Almere, the workshop participants are asked to take an imaginary walk through the to-be-designed urban spaces, and subsequently to express their feeling of the city (the meanings and perceptions of the urban spaces) using references to other familiar existing cities around the globe, metaphors, analogies, images, stories, and arguments. An example of managing by designing the social frame can be seen in the urban design atelier of the Zuidas/Mahler4 project wherein the urban designers, architects, and managers work together. In the atelier, the informal social atmosphere stimulates mutual dialogue and exchange of ideas between different designers and between the manager and the designer.

The social interaction in designing can become significant in the design team composed of members possessing complementary team roles and characteristics. Successful collaboration results in social contract when it is moral rather than contractual argument that turns the actors. One of the real examples of this is how group’s suggestion rather than management’s instruction has led Sjoerd Soeters changing and improving the design of Helicon building in De Resident project. The architect supervisor plays an important role as the social catalyst next to their task to evaluate and maintain the overall design quality. His role is harmonising the expertise and orchestrating the behaviour of the design group.

An example of managing by designing the project frame is instilling the integral design vision and altering the design goal to be opened to innovation during the design process. In the Nieuw Stadshart project in Almere, the urban vision is elaborated through close discussions between the master plan architects (OMA, represented by Rem Koolhaas and Floris Alkemade) and the clients. The clients critically examine the architects’ visions through technical-social-economical considerations of project realisation. After the master plan has been established, a Q-Team is set-up to develop and translate the vision together with the project architects through direct briefing and discussion.

In the Mahler4 project, the vision of Mahler4 is a part of the comprehensive urban development vision of Zuidas. This includes various urban issues, e.g. development plan, environment, infrastructure, mobility, economy, labour opportunity, leisure and culture, housing, and public facilities. To translate the vision into architectural design, a workshop involving all design actors and stakeholders is organised. In De Resident project, the vision is included in the “Design Guidelines LAVI-kavel” using architectural presentations. Thus, the guidelines are actually meant to share the design vision—such as block and building forms, spatial philosophy, and material and colour impression—rather
than to impose strict rules for designing. The architects share and build on this vision during the design workshops.

Before applying the conceptual framework of managing-by-designing for multi-architect collaborative design conception, one needs to consider the preferred personal skills of the person in the design manager role. He must possess rich knowledge and experience of urban and architectural design, and the development and realisation process of large and complex projects. At the same time, he must master human relationship to fuse the sometimes-individualistic architects into a smoothly functioning design group. Having these two competencies in a good balance supports the professional integrity of the design manager. Some analogies can be used to illustrate this. Just like a top football team needs a top coach, a design group consisting top architects needs a top design manager with highly respected knowledge, experience, and charisma. Team leading, coordination, training, and consultation occur through personal and direct interactions between ‘the coach’ and ‘the players’ in the ‘playing field’. The design manager also needs to combine rationality and passion, like in dance choreographing, which translates the passionate design talents into a more choreographed and staged process (Friedl, 2002). Moreover, he is like an orchestra conductor, whose role is to orchestrate various individual features and abilities to create a lively harmony. Conductors may not be able to play the instruments better than the orchestra members, but their value lies in their ability to bring the players together into a great performance.

In practice, the main targeted users, the architect supervisors, the managers, and the leading designers, can benefit from the new framework in the following ways. The architect supervisors possess rich knowledge and experience in urban and building design, and the personal quality as respected and highly credible senior professionals. However, the role of supervisor is new to many of them. The framework can inspire them to turn their design know-how to create and instil visions, give inspirations and guidelines to the design group, as well as clarifying their role in preparing and leading design workshops. The senior project managers usually have in mind numerous patterns of decision acquired from long experience in various complex situations. For decision making under uncertainties and lack of facts, the framework can point to the experts’ intuitive judgement to fill the gap in systematic analysis. Designer’s cognitive tools like sketching and diagramming may also be useful to explore and conceive management strategies. The leading designers can benefit from the framework that empowers them to be able to enhance their creativity through group processes. Teamwork can result in the improvement of individual and integral design.

The new conceptual framework for managing multi-architect collaborative design conception does not limit itself to the ‘design activities’ presented in this paper. The new framework demonstrates the way of thinking and identifies the main issues, but it can be enriched by non-exhaustive aspects and linkages whose complementary interrelationships are dependent to the situation in different projects. The new framework fills in the gap of managing the people aspect to build a coherent design management practice. Without the intention to generalise or standardise, this research presents an example to consider the coherence between managing the people aspect based on the new principle of managing-by-designing and the existing design management approaches (Figure 1). The cognitive
activities in the project context can be supported by certain protocols, information, and coordination of tasks. The idea generation in the social context results in the design products that are designated for the stakeholders and communities with their specific goals and expectations. The collaboration in a real project takes place at an organisational system with its structure and procedure for operation and decision-making.

**Figure 1:**
An example to view managing the people aspect based on managing-by-designing in coherent relation with the existing design management approaches

**VALIDATION AND CONCLUDING REMARKS**
The assessment of the scientific quality of the research follows the notion by Groat and Wang (2002), Whitman (2003), and Sebastian (2005b). They argue that design process might be considered to be a form of research inquiry and that research activities associated with design should be assessed through different quality measures than those used to assess research in natural sciences. Groat and Wang address in a very helpful way the question of how research quality is maintained when a non natural science, non-positivist approach to research is adopted. They suggest that the social sciences offer well accepted research methods that might allow certain forms of design activity to be regarded as modes of research. In describing their model of research, they match the quality measures familiar to the positivist paradigm (such as validity, reliability, objectivity, and generalisability) with new measures of credibility, transferability, dependability, and confirmability. Thus, if a research activity associated with design is to be considered good quality research, it should aim to be credible, transferable, dependable, and confirmable. Credibility is a measure of the truth-value of research
activity, in much the same way as validity measures the truth in the natural sciences. A research activity associated with design can be shown to be credible if it can be confirmed through something akin to triangulation, whereby a variety of sources and techniques are used to cross-check the research outcome. To achieve transferability, a sufficiently ‘thick’ description of the research activities and outcomes must be provided so that others can adequately assess the value of the research. To establish dependability, a research activity associated with design should establish an audit trail that documents all the processes by which data are collected, decisions are made, processes are followed, and outcomes are analysed and interpreted. Neutrality, ensured by the presence of objectivity in the natural sciences, is guaranteed in the research associated with design by establishing confirmability through transparency of activity and reflexivity on the part of the researcher.

For the practical validation of the research findings, a new case study will be used. Simulating design sessions involving top architects working on (fictive or real) complex project in order to test the research findings does not seem to be feasible in this PhD research. Therefore, this research would use an existing case whose design process has been well recorded in videos, lectures, and reports. These documentations reporting the workshop of different design teams are to be analysed to determine whether the new framework adequately addresses the main issues, and whether the proposed innovative approach is practically relevant for similar cases of multi-architect collaborative design conception.

The multi-architect collaborative design conception for the design competition of Ground Zero in New York would serve as a very relevant case study for validation. There is no doubt about the significance and complexity of the project, which has attracted many top architects to form the collaboration in various design teams. From hundreds of submissions, six teams have been selected to develop the “New WTC Proposals” in the period of September to December 2002. The selected teams, some containing several architects, planners, or firms, are as follows: the team of Richard Meier, Peter Eisenman, Charles Gwathmey, and Steven Holl; the United Architects, the collaboration between Reiser Umemoto, Foreign Office Architects, Greg Lynn FORM, Imaginary Forces, Kevin Kennon Architect, and UN Studio; the THINK team composed of Shigeru Ban, Frederic Schwartz, Ken Smith, Rafael Vinoly; the team of Skidmore Owings & Merrill with Field Operations, Tom Leader, Michael Maltzan, Neutelings Riedijk, and SANAA; Studio Daniel Libeskind; and Foster and Partners.

The framework serves as a conceptual basis and turning point to guide the practice through the process of integrating design competence into the management. It is also expected to expand the purview of design to include not only products, services, and experiences, but also the organisational means by which they are created and supported. The framework enriches the people’s views of design management by provoking a series of revealing insights regarding the social-psychological approach. It hopes to open new horizons for the science and practice of design management and presents guiding images for the future. The implementation of the framework is oriented towards progressive and fundamental improvement in the world of architectural design management, rather than one-time radical breakthrough.
References