

# TeMA

Journal of  
Land Use, Mobility and Environment

This special issue collects a selection of peer-review papers presented at the 8th International Conference INPUT 2014 titled "Smart City: planning for energy, transportation and sustainability of urban systems", held on 4-6 June in Naples, Italy. The issue includes recent developments on the theme of relationship between innovation and city management and planning.

Tema is the Journal of Land use, Mobility and Environment and offers papers with a unified approach to planning and mobility. TeMA Journal has also received the Sparc Europe Seal of Open Access Journals released by Scholarly Publishing and Academic Resources Coalition (SPARC Europe) and the Directory of Open Access Journals (DOAJ).

# INPUT 2014

papers selected

## Smart City

planning for energy, transportation  
and sustainability of the urban system

## SMART CITY

## PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM

Special Issue, June 2014

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# TeMA

Journal of  
Land Use, Mobility and  
Environment

TeMA. Journal of Land Use, Mobility and Environment offers researches, applications and contributions with a unified approach to planning and mobility and publishes original inter-disciplinary papers on the interaction of transport, land use and environment. Domains include engineering, planning, modeling, behavior, economics, geography, regional science, sociology, architecture and design, network science, and complex systems.

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Journal of  
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This special issue of TeMA collects the papers presented at the 8th International Conference INPUT 2014 which will take place in Naples from 4th to 6th June. The Conference focuses on one of the central topics within the urban studies debate and combines, in a new perspective, researches concerning the relationship between innovation and management of city changing.



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## EIGHTH INTERNATIONAL CONFERENCE INPUT 2014

### SMART CITY. PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM

This special issue of TeMA collects the papers presented at the Eighth International Conference INPUT, 2014, titled "Smart City. Planning for energy, transportation and sustainability of the urban system" that takes place in Naples from 4 to 6 of June 2014.

INPUT (Innovation in Urban Planning and Territorial) consists of an informal group/network of academic researchers Italians and foreigners working in several areas related to urban and territorial planning. Starting from the first conference, held in Venice in 1999, INPUT has represented an opportunity to reflect on the use of Information and Communication Technologies (ICTs) as key planning support tools. The theme of the eighth conference focuses on one of the most topical debate of urban studies that combines , in a new perspective, researches concerning the relationship between innovation (technological, methodological, of process etc..) and the management of the changes of the city. The Smart City is also currently the most investigated subject by TeMA that with this number is intended to provide a broad overview of the research activities currently in place in Italy and a number of European countries. Naples, with its tradition of studies in this particular research field, represents the best place to review progress on what is being done and try to identify some structural elements of a planning approach.

Furthermore the conference has represented the ideal space of mind comparison and ideas exchanging about a number of topics like: planning support systems, models to geo-design, qualitative cognitive models and formal ontologies, smart mobility and urban transport, Visualization and spatial perception in urban planning innovative processes for urban regeneration, smart city and smart citizen, the Smart Energy Master project, urban entropy and evaluation in urban planning, etc..

The conference INPUT Naples 2014 were sent 84 papers, through a computerized procedure using the website [www.input2014.it](http://www.input2014.it) . The papers were subjected to a series of monitoring and control operations. The first fundamental phase saw the submission of the papers to reviewers. To enable a blind procedure the papers have been checked in advance, in order to eliminate any reference to the authors. The review was carried out on a form set up by the local scientific committee. The review forms received were sent to the authors who have adapted the papers, in a more or less extensive way, on the base of the received comments. At this point (third stage), the new version of the paper was subjected to control for to standardize the content to the layout required for the publication within TeMA. In parallel, the Local Scientific Committee, along with the Editorial Board of the magazine, has provided to the technical operation on the site TeMA (insertion of data for the indexing and insertion of pdf version of the papers). In the light of the time's shortness and of the high number of contributions the Local Scientific Committee decided to publish the papers by applying some simplifies compared with the normal procedures used by TeMA. Specifically:

- Each paper was equipped with cover, TeMA Editorial Advisory Board, INPUT Scientific Committee, introductory page of INPUT 2014 and summary;
- Summary and sorting of the papers are in alphabetical order, based on the surname of the first author;
- Each paper is indexed with own DOI codex which can be found in the electronic version on TeMA website ([www.tema.unina.it](http://www.tema.unina.it)). The codex is not present on the pdf version of the papers.

## SMART CITY PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM Special Issue, June 2014

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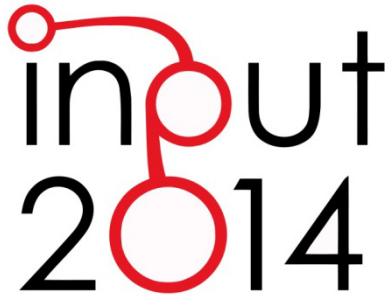
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## SPECIAL ISSUE

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Smart City - Planning for Energy, Transportation and Sustainability  
of the Urban System

*Naples, 4-6 June 2014*



## THE CREATIVE SIDE OF THE REFLECTIVE PLANNER

UPDATING THE SCHÖN'S FINDINGS

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### ABSTRACT

The self-reflection on their own work has always been present in all designers, including architects and planners. In the mid 80-90 Donald Schön has made more explicit this aspect, which until then had not found a systematic scientific treatment.

The results of Schön are the basis of practical planning of the 90s period. However, the Schön's analysis reveals a context of knowledge of mental functioning typical of the conceiving period.

From the 90s until now numerous advances in knowledge of the mechanisms of rationality, reflection and creativity have been made, and in this context we are interested in the progress made in the field of creativity.

We try to integrate and update the Schön's reflection with the new available theories such as the CK theory to offer planners a more innovated range of tools in order to understand and make better use of their creativity and self-reflection about their own creativity.

### KEYWORDS

Creativity, Self-reflection, CK theory

## 1 INTRODUCTION

The aim of the paper is pointing out the advances about rationality mechanisms, reflection and creativity of the practitioner/planner. For a proper understanding of the innovation made by Schön it is useful having a brief excursus about the Schön's starting context.

In the Sixties the practitioner is conceived as an expert, as an incarnation of the knowledge of his own field. But in the subsequent years the figure of the practitioner was affected by a crisis phase. It was verified that the practitioner solves problems but often he can't foresee all the consequences of his choices and the problematic situations that could take place. So it was clear that a practitioner moves himself and his decision in a limited rationality situation. There was a great loss of trust in them and the practitioners themselves felt not being enough to follow progress and all technological news.

The Schön's thought plays a fundamental role in this context characterized by the need of change and by the need of a new awareness of our knowledge. His innovation consisted in highlighting some mechanisms of reflection during the action and about the action, so that according these new assumptions, the practitioner is not more the infallible expert, but a reflexive practitioner, someone that knows that has to think deeply about what is doing, about his choices and their consequences. Should be noted that Schön, in his book, takes through all the professionals while our study focuses on the analysis of the role of planners. Our research aims to understand what happened in the twenty years since following the Schön's book publication, *The Reflexive Practitioner* (Schön 1983), with a special attention to the creativity theme. In chapter 2 we propose a short recall of Schön's findings; in chapter 3 we talk about the advancement on creativity studies, in chapter 4 we try to apply new techniques about creativity to Schön's findings; in chapter 5 we purpose four examples of four different plans analyzing their genetic formation; in chapter 6 we have some conclusions.

## 2 THE SCHÖN'S FINDINGS: A SHORT RECALL

Schön refuses the Sixties vision about the practitioner's knowledge and removes the separation between research and practice. He recognize that practitioners can be reflexive researchers when they have to deal with situations characterized by uncertainty, instability, unicity and conflict.

The practitioner, through the reflection-in-action, and on action per-forms a research activity on his own practice in a continuous process of self education.

He recognize errors and accepts that the succeeding uncertainty can be a possibility for a new discovery. Reflecting during action can modify the action itself.

The reflexive practitioner deals with every problem he has to solve thinking that it is an unique one, then thanks to his experience and his memories of practice he refers to some elements of the repertoire that is familiar to him , in order to know how to behave, avoiding problems already faced in the past in similar situations.

If practice should be based on a scientific theory that can only be achieved through controlled experiments, this can't happen in reality, in fact Schön sustains that a true experiment generally takes place during practice and consists in looking at where action leads. The most important question of the experimental phase is: What if ?, so the practitioner must consider not only the current choice but also the tree of subsequent situations to which it leads. Therefore, the reflection-in-action necessarily implies the experiment.

Virtual worlds are useful and comfortable contexts of experimentation for practitioner, in which they can temporarily remove or check out some of the obstacles against a strict daily reflection-in-action. The skill in



handling media, languages and repertoires is essential for the reflective conversation of the protagonist with the situation.

According to Schön's conception, the relationship between the practitioner and the client – the one who makes use of the professional's work- must also change: Like reflective practice takes the form of a reflective conversation with the situation, so the relationship of the reflective practitioner with the client takes the form of a reflective conversation (Schön 1983).

First, the practitioner must reflect on his own tacit understandings, which consist in the construction of the problem, strategies of action and model of phenomena, and must make them available to the client.

The client, then, must act in many ways as a reflective practitioner, because he must cultivate skills through the reflective conversation with the professional.

## 2.1 SCHÖN'S FINDINGS ABOUT PLANNING

As regards the planning, its social context is characterized by the presence of institutions organized around conflicting interests. Planners do not follow the model of centralized planning anymore, but they carry out practice in relation to a growing variety of stakeholders and control systems, and they have developed a variety of new or transformed roles, such as spokesman, strategists, consultants or technicians. The professional role requires a specific behaviour from the professional, but according to it, each individual develops a particular way of structuring his role, which is connected to the problems setting, the type of strategies he adopts and the interpersonal theories of action he develops. This degree of freedom is a clear form of creativity.

It is also clear to us that the reflection in the course of the action of a professional is a creative process too, because it varies on the grounds of a number of factors such as the scope, the level of detail and the structure type of the role that the same professional has built.

## 3 THE ADVANCEMENT ON CREATIVITY STUDIES

The creativity problem can be indicated as an highly representative index of the scientific culture of XX century, a sort of guiding idea: the discover of the creativity problem. Previously there were informal notions or almost-technical ones, heterogeneous notions with multiple applications. In the XVIII century the creativity was considered like a superior knowing position, a superintellectual activity or an activity opposite to the intellect, a peculiar intuition. So there was something like creativity vs regularity or creativity vs legality. (Garroni 1978)

The scientific problem of the creativity is outlined when creativity started to be considered in a systematic way: a creativity according rules or a creativity submitted to a general legality.

According the cognitive psychology the creative thinking, or the productive thinking is connected to a genetic consideration: it is the evolutive side of the intellectual abilities and of the correlated structures.

Starting from Darwin is in place a deep review of the almost classic opposition between instinct (animals') and intelligence (humans'). Instinct and intelligence are not two different and opposite types of behavior but they are formally the same, id est humans and animals are unified under the sign of the biological and of the cultural one. It means that even animals are cultural animals, able to produce a creative culture (new behaviors) and to transmit it (Garroni 1978).

Piaget institutionalizes the creativity notion: creativity is the structural transformation, it is the internal motor and it characterizes the appropriation of the reality carried out by man. Creativity acts in favor of an effectiveness and continue knowledge construction. Creativity can't be disjoint from the accordance to rules, creativity is rule chained (Garroni 1978)

So the idea of creativity as mental attitude of human beings is born only in the twentieth century. Among the definitions of creativity, there's one particularly interesting for our research: "Creativity is to combine existing elements with new and useful combinations" (Poincaré 1924)

In the cognitive environments of artificial intelligence research (Boden 2000; Hofstadter 1995; Johnson-Laird 1988; Minsky 2006), creativity is seen as a normal function of the human intellect, to be analyzed according to a strict theoretical and experimental scientific investigation. The modeling and design of artificial space environments, cities and urban architectures in particular, must take into account highly heterogeneous information sources.

From the analysis carried out so far in this field emerges the important role played by memory in the work of the designer. In fact, he takes the elements stored in his memory to build intrinsically creative solutions to the problem that he needs to solve.

Memory is the mental function that assimilates, retains and recalls information learned during the experience. It's necessary distinguish between short-term memory (MBT) and long-term memory (LTM), (Atkinson and Shiffrin 1968). Information are remembered, in the first type of memory, for some tens of seconds or minutes, while, in the second one, for prolonged periods and in this case, once stored in the brain, can be retrieved when it is necessary.

The relationship between memory and the project is not a deterministic one. Designing processes have an iterative, nonlinear and recursive proceeding and they follow one another in the inner part of a design procedure; so we have to consider: (i) memories – bases elements, (ii) memory about elements use, (iii) succession of mental actions that produce objects.

Creativity acts according the meta operational intention, that plans activities to reach the wanted results, a chain of operations not conceived before. Human adaptation in the ambient never be a total one, creativity is the adapting mood to the chronicle incompleteness to the adaptation and the self-reflexive creativity analyses the results of the creative behavior trying to discover out limits and errors and refining choices.

Research on creativity has led to the formulation of new theories and methods, which have made a great contribution to designers in improving the knowledge and in using their own creativity.

One of the main theories is the CK theory, in which two spaces are individuated, one of concepts, C, and the other of knowledge, K. A concept is defined as a proposition without logical status in the space of knowledge. The space of knowledge is defined as a set of propositions with a logical status, in accordance with the knowledge available to the designer.

The design process is defined as a co-evolution of C and K through a logic of processes of expansion of the two spaces (Hatchuel and Weil 1999, 2002), we'll describe later too.

Moreover, assuming that the action and the adaptation of an agent are not independent from the environment in which these agents act, a new version of the CK theory has been proposed, known as the theory C/K/E, (Kazakçı and Tsoukias 2005). It includes an environment E, which is functional to the creation of tools adaptable to the design. The theoretical framework given by the C/K/E theory offers the possibility of a theoretical and personal background, as a creative and adaptable design tool that uses constitutive memories and foundation references.

#### 4 REVIEWING FROM THE METHODOLOGICAL POINT OF SCHÖN'S CONCEPT OF CREATIVITY

In his book Schön does not deal with the issue of creativity in an explicit way, but creativity does emerge, tacitly, almost unawares. Schön argues that action must necessarily be accompanied by reflection, in order

to create new solutions during the analysis of the problem and in order to act in real time to apply them but never talks about creativity.

The biggest difficulty in analyzing creative processes is about their non-transparency: we can't read inside ourselves while our head is working, but we can be conscious about something is happening and we could lead it in a someway. When you're observing a creative process you have to know that the process will change because it is reflecting about itself and the analysis studio becomes a bigger deal (Legrenzi 2011) Thanks to the research carried out in this field in the last twenty years we know that creativity is an integral and essential aspect of the figure of the practitioner. Creativity depends on the context, the environment, the teachers, landmarks and lifestyle choices.

A closer look at creativity as search outlined a view of creative concept generation as a very general search process, even if that formalisation has not been developed much in the past few years. Researchers established that it is methodologically beneficial to have fully precise, detailed and formal accounts of any mechanisms being considered as 'creative' (Ritchie 2012). For an example Creative Systems Framework (CSF) (Wiggins 2006a; 2006b) emphasises the notion of search as the central mechanism for simulating creativity, and outlines how a metalevel search could represent some phenomena sometimes discussed as 'transformational' creativity. It is important to realise the importance that the underlying intuitive ideas have: creation as the exploration of a 'conceptual space', and possible 'transformation' of that space. (Ritchie 2012).

We can imagine the thought distinguished in two different branches in reasoned thought and intuitive thought (Bruner 1966). The reasoned thought proceeds step by step with the almost complete mastery of information and it is based on a precise reasoning, on logical or mathematical tools or on defined actions. The intuitive thinking on the other hand does not proceed with a plan which is organized in a formal way and it belongs to the people who think intuitively. The merger of these two types of thoughts leads the designer to recall past actions useful to the context in which he is located, digging through the contents of his memory using the association and order's principles. The subsequent reasoning is possible only through knowledge. To know means possess information obtained through experience or learning, but, as it is clear from Schön's thought, this is not enough, because the practitioners must also be aware to know to reach the conscious knowledge.

#### 4.1 SCHÖN'S FINDINGS ABOUT PLANNING

In his book Schön doesn't explain how the practitioner must behave in the practice of the profession itself. He asserts that the reflective professional, through the reflection in action and on action, is protagonist of a continuous process of auto-education.

As the search has recognized the importance of the creativity in the planning and design processes, and the importance of the self-consciousness about creativity, many techniques are been developed to implement and enhance creativity itself. So, the planners have a higher range of conceptual and operational tools to better understand and utilize their creativity. Our aim is trying to integrate the Schön's reflection in the light of these advancements. Here we give brief outlines about three.

We already talked about an important technique the CK theory, it concerns a continued cooperation between the set of concepts and the set of knowledge, through continuous movement between these two spaces. The result is a new object before unknown, something that existed in a different form in the K space which is enriched with new properties encountered in the C space, it returns back to the knowledge space as something 'accepted', with its own set of properties which have logic (Hactuel 2002).

Another branches of studies about creativity focused on the 'combination' of the elements. This involves the addition of part or all of one design prototype called the combining design prototype to an existing design prototype called the focus design prototype. Creative design is not only the production of "novel and valuable ideas", but also using odd ideas for the generation of valuable new knowledge. Analyzing a creative design action we recognize three different parallel processes:

1. combination;
2. analogy;
3. mutation.

The operations of creative design can be captured with a high level of generality (Gero 2006)

Another important theory that gives important techniques to enhance creativity is TRIZ. It is a Russian acronym for "Teoriya Resheniya Izobreatatelskikh Zadatch", Genrich Altshuller theorized it. It is an attempt to improve on a random approach to innovation and invention by structuring the creativity in paths which have been shown to yield results. The TRIZ approach encompasses a number of different tools and techniques for specific domains, including 40 inventive principles and contradiction tables, for an example some of them are: segmentation, extraction, local quality, asymmetry, et cetera.

In a someway all this could have a start in Schön's the idea that planning, and in general a practitioner activity deals with the 'problem solving'. Problem solving consists in the research of the problem solution, it is no longer the only appropriate response to reality, at least if not completed by the problem setting. There is then a more 'problematic' approach to the reality, which considers each situation in its complexity and in its uniqueness: the "reflection-in-action".

During the process of reflective conversation with the situation, the practitioner, from the applicative point of view, can take advantage of some tools, specific for the different phases, in order to explicit and represent the whole process in a formal manner.

In the first phase of the formulation of the project – the problem setting – Schön proposes the use of the conceptual map. It is a graphic instrument of representation of information and knowledge, and it is useful to the practitioner to conceptualize his knowledge of the problem he has to solve. The conceptual map aims to contribute to the achievement of 'meaningful learning', ie it useful to change the practitioner's cognitive structures.

In the subsequent phase of problem solving, the professional can take benefit from the mental map, it is different from the conceptual map. The mental map supports the elaboration of thought and the creativity, so it is useful in the research of possible problem solutions. A mental map is a tool based on recall, exploiting the mental unconscious resources; it can be the starting point of a creative process.

Moreover, mental maps are particularly efficacious as tools of annotation and learning, in order to help the personal orientation and the creation of work groups. They can be also used in the "reflective conversation" between professional and client, because they are considered by Schön as a real work group.

## 5 FIRST ATTEMPT TO APPLY REVISED SCHÖN'S CONCEPTS TO PLANNING

For a first trial of application of Schon' concepts revised in the light of recent theories of creativity, we consider urban planning at municipality level (ruled by the PGT – Governance of the Territory Plan).

In every part of a PGT we can recognize creativity working, and in particular the practitioner has more freedom in outlining the Plan Document (DdP). In the DdP are observed some elements of creativity concerning the phase of definition of the indicators, as they are not standard. Among the PGTs we analyzed, those of Inzago and Cologno Monzese are the richest in terms of indicators and some examples are: the daily movements of the population and the level of unemployment.

However, the creativity knows most important points of expression in the construction of future scenarios. Future scenarios are generated from the knowledge framework, when the planner prospects a scenario, he builds 'memories of the future', ie in the specific future image of the community, starting from his wealth of experience and memories. This process, called 'visioning', also includes the definition of actions required to really achieve this future image of the city. In the whole process an active participation of the citizens is necessary, in order to take into account the community's wishes. Moreover, thanks to the citizen's participation, the planner is able to create a comprehensive SWOT analysis that highlights strengths, weaknesses, opportunities and risks relating to each objective. This analysis is made explicit, for example, in DdP of Cologno Monzese but not in the Casirate d'Adda one.

The exercise of visioning could seem to the planner himself 'only' a deductive process, instead, he makes use of his own creative skills that are not declared in the plan, because often he is not aware. In fact, in PGT analyzed only the final product is reported. For an example, in the PUG of Lecce five different strategies are shown: Lecce as a sustainable city, competitive and innovative, accessible, as a city which regenerates itself and eventually as a city that enhances itself.

From all this it follows that the role of a planner is very complex, in fact he should be: a political expert (to understand interests playing and know how to manage the conflict), a creative set designer (to build the future vision of the city), an historian (because he must know the past, ie local identities, in order to understand the present and build the future) and a reflective practitioner (because he must be aware of his creativity in order to construct the memory of the future).

## 6 CONCLUSIONS

The analysis made about the mechanisms of creativity seemed us being promising, should now be must be deepened by defining more accurately the processes of thought and action that are typical of the designer/planner.

Moreover, from the applicative point of view it would be useful to extend the research in the future to a large amount of PGT in order to see if these concepts are valid in all cases.

Through scientific studies focused on memories, knowledge can be improved in this field of research both starting from existing general theories and generating other ones.

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