

Facing urban uncertainty with the Strategic Choice Approach: the introduction of disruptive events

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Isabella M. Lami, Elena Todella  
FACING URBAN UNCERTAINTY WITH THE STRATEGIC  
CHOICE APPROACH: THE INTRODUCTION  
OF DISRUPTIVE EVENTS

*Abstract*

The Strategic Choice Approach (SCA) is a method meant to deal with operational decision in a strategic way and to manage different sources of uncertainty in decision-making processes. The paper describes how SCA can deal with the future in the specific realm of urban planning in current cities, which represents a typical example of Wicked Problem, taking into account the three different levels of uncertainties that the method aims to manage (Uncertainties about the working Environment, UE; Uncertainties about Related decisions, UR; Uncertainties about guiding Values, UV). We argue that these three types of uncertainties are referred to the 'ordinary' problems of modern and contemporary cities. The project of an architectural/urban transformation has to do with this kind uncertainties and implications – in overcoming a series of approvals of different institutional order – and, with this purpose, takes the form of a contract. Instead, this categorisation doesn't conceive some new and uncertain challenges of future cities, around climate change, infrastructural disruption, insecurity, pandemics, at local and global scales, that are currently under debate in the cities. In this study we suggest that this character of uniqueness can imply the exploration of a new category of uncertainty in the SCA scheme, the 'uncertainty about disruptive events (UD)', a type of catastrophic or just unknown in their effects. First of all, we define the PSMs (Problem Structuring Methods) as methods of structuring the «wicked problems». Secondly, we examine the SCA as «a strategic choice process through time», taking into account the three different levels of uncertainty that the method intends to manage.

*1. Introduction*

In the late 1960's an approach to manage diverse source of uncertainty in a strategic way was designed in an English research project focused on the process of strategic decision making in city government (Friend, Norris 1988).

The method, named Strategic Choice Approach – SCA – (Friend *et al.* 1970; Friend, Hickling 2005) was meant to deal with operational decisions, in order to facilitate choices, adapt to changes in the decision-making situation and systematically manage the uncertainty that is inherent to each decision-making process. In particular «the emphasis on managing uncertainty can be seen as the most distinctive feature of SCA, leading to a focus on the strategic management of uncertainty through time» (Friend 2011). In fact, the actions taken in order to reduce uncertainty can influence and shape the effects in the process and its future course (Friend 1993; Friend 2011), by investigating different possible futures, in order to promote and guide present action.

SCA belongs of the Problem Structuring Methods (PSMs), participative and interactive methods finalised mainly on structuring the problems rather than directly solving them (Rosenhead 1996). PSMs have been developed due to the gap in traditional Operational Research (OR) and decision analysis, which did not address satisfactorily complex, ill-structured problems, also defined ‘wicked problems’ (Rittel, Webber 1973), a complex problem for which there is no simple method of solution. Design studies have received much attention during the 60s and 70s, when Horst Rittel proposed this definition of wicked problems, by arguing that most of the designers deal with this kind of problematic situations (Sutton *et al.* 1986; Buchanan 1992). Indeed, design research and practice normally tackle a kind of ill-structured, ill-formulated problems (such as designing a building, transforming urban historic areas, or deciding on a transportation policy), that have become increasingly complex (Lami 2018). In particular, «the problem for designers is to conceive and plan what does not yet exist» (Buchanan 1992). Designers always try to describe and control what is yet to happen, by imagining the implications of choices, the possible consequences of different alternatives, and their potential links and associations. Even if the final result and the future are unknown, it is still possible to investigate strategic ways and approaches to manage the uncertainties about future events and consequences of choices made in the present (Friend, Hickling 1987; Mingers, Rosenhead 2004), in order to reach the final effect.

The assumption that led to the development of PSMs was that in real world situations it is not always possible to find a single uncontested representation of the problem situation under consideration. To meet these shortcomings, the PSMs were devoted to represent the problems observing their multiple perspectives (Mingers, Rosenhead 2004). A representation was necessary at an early stage to cover most of the characteristics that impacted these systems, using visual, rather than analytical models, to enable: understanding and discussion of the problem, increasing engagement, and identification of potential improvements.

SCA belongs to the three methodologies of the PSMs that stand out for applicability and quantity of published papers (with SSM and SODA) (Mingers, Rosenhead 2004). Even if conceived in the '70s, SCA is still applied in its original form.

This paper intends to investigate how SCA deal with the future in the specific realm of urban planning in current cities. The analysis of complex real-world processes – involving multiple actors, perspectives, skills, roles, interests and resources – aims at structuring and better coordinating all the entities taken into account, in order to obtain results and solutions to problems, and to promote present actions. Any form of planning is affected by a problem of uncertainty in respects of possible alternative consequences and courses of action (Sutton *et al.* 1986); in this sense, several exploratory approaches (e.g. strategic choice approach and future studies) recognizes and try to handle uncertainties in explicit ways, in particular in urban planning (Khakhee 1993), as a tool for representing and comparing alternative transformation scenarios, with the purpose of a commitment to future actions (Friend, Hickling 1987). Even if it is not possible to completely control the final effects of the process, SCA and PSMs in general try to structure and control the different subsequent step of the process that leads to these affects. In this sense, both SCA and architectural and urban design scholars try to deal with the future - aiming at structuring the present actions and practices - in order to reach the set goals and material effects for the transformations. Since in all these fields the issue of future is a current problem, SCA is examined in its way of structuring the process and managing key uncertainties, to approach the challenge of designing in an «uncertain world» (Friend, Hickling 1987).

The paper discusses the possibility of introducing an additional category of uncertainties (related to disruptive events) to the traditional three defined by the method. First, we define PSMs as a way of structuring «wicked problems» (Rittel, Webber 1973). Secondly, we investigate SCA as «a process of choosing strategically through time» (Friend, Hickling 2005), taking into account the three different levels of uncertainties that the method aims to manage. Starting from this distinction in SCA, we thirdly explore the correlation and meaning of typical problematic implications and uncertainties in architectural design and urban transformation contexts, in current cities. Finally, we suggest that, since there are new issues and uncertain challenges that pervade public and political debate about future cities, an additional category of uncertainty could be added to the traditional scheme of SCA.

## *2. Problem Structuring Methods (PSMs) to approach wicked problems (WPs)*

PSMs (also known as Soft Operational Research) were developed when the limitations of the purely mathematical methods of OR became apparent during the 1960s and 1970s (Mingers 2011). OR was initially developed in the 1940s as a very practical and multidisciplinary activity, with the goals of solving problems using any method and data that were appropriate or available, particularly with mathematical techniques. Unfortunately, it was

not entirely suitable for solving social problems, with confuse information, different decision makers and conflicting values (Table 1). It was during this period that PSMs were developed by academics and practitioners in response to practical commitments with real problems – involving complexity, uncertainty and conflict – accompanied by an extensive critique of the traditional OR (Rosenhead, Mingers 2001).

Hard Operational Research	Soft Operational Research
Problems formulation in terms of a single objective and optimisation. Multiple objectives, if recognised, are subjected to trade-offs on to a common scale	Non optimising: seeks alternative solutions which are acceptable on separate dimensions
Overwhelming data demands, with consequent problems of distortion, data availability and data credibility	Reduced data demands, achieved by greater integration of hard and soft data with social judgements
Scientisation and depolitization, assumed consensus	Simplicity and transparency, aimed at clarifying the terms of conflict
People are treated as passive objects	Conceptualises people as active subjects
Assumption of a single decision maker with abstract objectives from which concrete actions can be deduced for implementation through a hierarchical chain of command	Facilitates planning from the bottom-up
Attempt to abolish future uncertainty, and pre-take future decisions	Accepts uncertainty, and aims to keep options open for later resolution

Table 1 - A comparison between Hard OR and Soft OR  
Source : Kain, 2003, after Rosenhead 1989

There are specific characteristics of problem situations that make the traditional mathematical modelling tools of OR ineffective. In particular (Mingers 2011):

- the ‘problem’ itself is not well-defined with agreed objectives such that efficient means to achieve the objectives can be constructed;
- the situations involve several interested parties whether they are departments within the organization or cooperating (or conflicting) external bodies. These generally hold different perspectives about the problem situation;

- there are many uncertainties and often a lack of reliable (or indeed any) data;
- ‘success’ requires the generation of a degree of agreement among the parties involved to undertaking particular courses of action, although agreement about the nature of the problem may then lead to more traditional OR activity. The process is primarily one of learning and negotiation rather than the technical solution of a problem.

These ill-structured problems, such as the planning problems, the environmental or social ones for instance, were defined by Rittel and Webber (1973) ‘wicked problems’, and later ‘messy problems’ (Ackoff 1974) or ‘social messes’ (Horn 2001).

Wicked problems (WPs) are those for which there is no clear arrest rule, then we cannot say with certainty that we have ‘finished’ with the problem and have found an exhaustive resolution. In fact, working more could lead to a better solution, because there is no single right answer and every new attempt can be important and significant (Rittel, Webber 1973), in the sense that every formulation of a WP corresponds to the formulation of a solution (Buchanan 1992). Architectural design and urban transformations wicked problem impact people, stakeholders, interests, politics, as complex issues in a dynamic social context (Ritchey 2011). Such unstructured problems have to manage multiple actors, multiple perspectives, conflicting interests, key uncertainties; in this sense, compared to well-structured problems, they need to be defined in a more ‘strategic’ way (Rittel, Webber 1973; Rosenhead, Mingers 2001; Schön 1987).

There is no ‘given’ problem, simply waiting to be solved, because there is not necessarily objectivity in such problems, and they could have many possible descriptions and definitions; moreover, wicked problems are often symptoms of different and deeper problems. Furthermore, there is generally a range of actors, who are not in subordinate-superordinate relationships, but have considerable autonomy. These actors have different interests and perspectives, which lead them to pursue distinct objectives and identify different factors as relevant (Rosenhead 1996). There is therefore a potential conflict, often exacerbated by the high levels of uncertainty that the actors commonly have to bear considering and structuring a problem of this kind. These social planning problems (Rittel, Webber 1973) are difficult to define and to manage, because they take place under the so-called «genuine uncertainty» (Ritchey 2011), that is the impossibility to predict and calculate what might happen in the future. In fact, choices between alternatives are affected by uncertainties about future events that influence their consequences (Mingers, Rosenhead 2004). Mention has to be made to the fact that in the ’70s, ‘urban renewals’ was mentioned by Rittel and Webber as a typical example of a WP. Current conditions of the cities’ development have even exacerbated the issue. It is possible to distinguish

a series of concerns that can be grouped in three main features: i) the measurable dimension of the problem, mainly related to the physical and spatial dimension of that peculiar economic good represented by the urban tissue; ii) the specificity of the decisional processes in this realm; iii) the normative dimension (for further information see Lami, 2018).

PSMs can help representing the problematic situation by defining some models that will allow people involved to clarify it and to identify potentially feasible commitments in order to solve it (Mingers, Rosenhead 2004); these alternative commitments are continuously investigated in compatibility with the possible configurations of the future environments. In this way, PSMs deal with the future of social reality, not only by describing, but also trying somehow to construct and structure it. PSMs offer mechanisms to address these complex problems, represent the problematic situation in a structured way and develop innovative solutions (Lami *et al.* 2014); the interventions are conducted in groups, with an iterative process; they are participatory and interactive and operate in a non-linear way, switching between the different steps of the method freely (Rosenhead 1996). The key word in PSMs is 'structuring' (Franco 2006): structuring is used in order to identify activities that are relevant to the problematic situation, to clarify the relationships between them, to focus on key concepts, and to generate alternative options for consequent future actions. These relationships between concepts, activities or stakeholders, similarity or influences, and the relationships between options, are often graphically represented. The goal is to model the relationships through which the various elements that make up the problem are identified: by modelling the relationships, the PSMs models are designed to help the participants to establish the structure of the problem (Franco 2006). In fact, the essential difficulty with respect to complexity is not, first of all, in its resolution, but in the approach to face it. Since complexity is unresolvable when accompanied by disorder, the path to the resolution of complexity is found with approaches that can transform disorder into some order, structuring problems precisely.

### *3. Managing uncertainties with Strategic Choice Approach*

SCA aims to assist in the identification of relationships between seemingly unconnected sectors; moreover, to start from an awareness around complexity of problems to be faced means also to accept the consequent uncertainty related to future actions. Participants try to clarify situations and resolve uncertainty by raising and comparing alternatives for making decisions of strategic nature. In particular it attempts to manage diverse sources of uncertainty in a strategic way (Friend, Hickling 2005). The field of decision situation covered by the policy system is thus seen to include a large variety of problems, sometimes interrelated only in a subtle way.

It is emphasized that a policy system is not the only form of institutional system that influences decision making, but that is distinguished by comprising some set of recognized rules, policies, objectives and precedent acknowledged by the actors within the system, here called 'policy guidelines'. There is evidently also a number of actors involved and these maintain relations, formal and informal, that may be internal relations between them or external relations to actors outside policy system boundaries.

In urban and territorial contexts, through the application of SCA, the planning choices and the projects are elaborated and selected only after the identification and evaluation of different possible alternatives (as options); the need to operate quickly is consistently pursued, with the aim of maintaining maximum flexibility and effectiveness for future choices. In fact, this method does not lead to the drafting of plans as rigid systems of prescriptions; instead, it identifies the actions and the projects to be carried out in the successive phases of an incremental and continuous process. The choice of actions to address some parts of the problematic situation will leave other choices open for the future, creating opportunities for future remodelling of problems such as the occurrence of unforeseen events and the appearance of new connections (Friend, Hickling 2005).

SCA generally begins with the identification of a series of related decision problems and consists of four phases (Friend, Hickling 2005) – as also shown in Fig. 1:

- Shaping mode: first of all, the decision makers will take into consideration and study the various decision areas in terms of their interrelation and relative importance or urgency. Decision areas are intended as the practical and specific problems identified in the general problematic situation. The goal in shaping is to select a subset of problems, that will form an appropriate focus or outline for the process. It is therefore a moment related to the shaping of problems, with the task of beginning to build up a set of choices to deal with; moreover, it constitutes a crucial way of investigating linkages between the decision areas and the possible connections between one field of choice and another;
- Designing mode: within each decision area, a set of options is identified and discussed, as feasible alternative solutions and possible courses of action available. The options are examined in pairs to see which ones are incompatible; it is therefore possible to consider all the combinations of options, to arrive at a series of potentially feasible decision-making schemes that cover all decision areas. Ultimately, a decision tree is built, with the choice of sequence in which decision options (and relative courses of actions) should be considered. Each sequence of options gives birth to a specific decision scheme, that is a scheme of actions to carry out;

- Comparing mode: the alternative decision schemes are then compared in pairs, with their evaluation in terms of different criteria (comparison areas) identified by the participants. These criteria are usually qualitative, critical and reflect a range of different values held by different stakeholders. The comparison in pairs of decision schemes is carried out using an advantage comparison grid, which identifies where the advantage lies on each dimension of the choice in different alternative decision schemes. In fact, a comparison of the consequences of each pair of alternatives can reveal undesirable consequences of one solution than the other. These advantage judgements across different schemes of actions are subject to much uncertainty, deriving in part from the context, in part from the values and the different scopes of stakeholders involved. In this, the consequent need is apparent for the management of uncertainties and the development of commitment through time;
- Choosing mode: lastly, this mode concerns the need to make decisions, to reach agreements between the different stakeholders and to commit for action through time. At this time the previously identified uncertainties need to be addressed; in fact, each uncertainty area embodies different types of relevant doubts and disagreements. For each doubt it is possible to imagine one or more exploratory actions, exploratory options, in order to reduce the relative sense of uncertainty before making decisions. The agreed combination of future explorations to reduce uncertainty is expressed in a set of commitments, with the preparation of a commitment package, that consists in a list of immediate actions, explorations of areas of uncertainty and/or agreements on ways to implement deferred choices in the future.

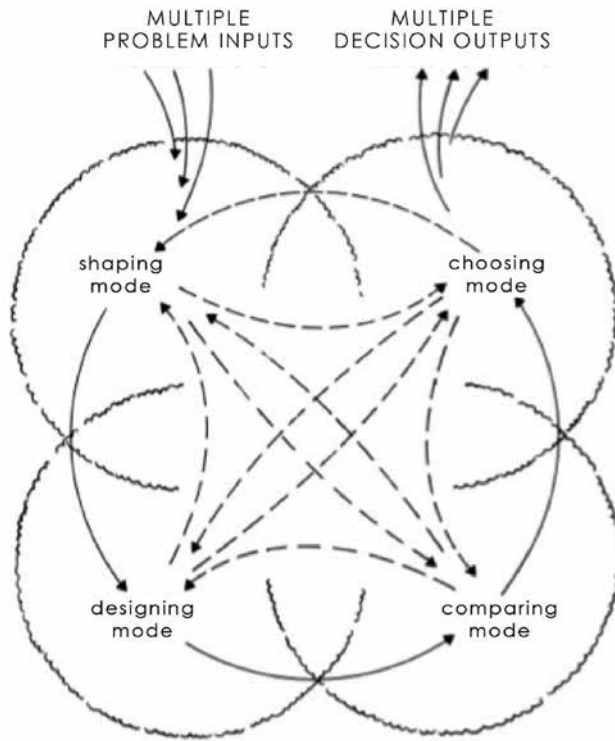


Figure 1 - The process of Strategic Choice Approach  
 Source: Friend and Hickling 2005

The decision-making process in SCA includes, therefore, three main elements: perception of a problem; exploration of a possible solution; commitment to an action. SCA acts within an uncertain world, in which the interested parties and their points of view are different, there are significant elements of uncertainty and a lack of information related to future actions; participants try to clarify situations and resolve uncertainty by raising and comparing alternatives, to make strategic decisions. In particular, SCA assumes that complex decisions are typically interconnected and characterized by different types of uncertainty, so the best direction is to achieve a balance between the assumption of initial commitments, regarding the most urgent decision areas, and the decisions left open, until the uncertainty is reduced.

It is recognized that any form of planning is characterized by different kind of uncertainties in respect of alternative consequences and courses of action (Sutton *et al.* 1986); consequently, planners always have to deal with uncertainties in the foreseeable future (Khakee, Strömberg 1993). The conscious management of

uncertainty, as a practical way of responding to complex problems, and the choice of incremental actions through time is a useful assessment of the consequences of some proposed future course of actions. Managing of uncertainties is always to some degree conjectural (Friend, Hickling 2005); however, it is possible to define different perspectives on uncertainty, to bear on present practice and its implications for the future process, in terms of procedures to clarify and reach decisions, rather than definitive plans.

In SCA, three different types of uncertainty are identified, as main categories of multiple sources of uncertainty (Sutton *et al.* 1986). This is not only a means of classifying, but also a useful reminder of the scope of the actions to be carried out in order to clarify the uncertainties itself; in fact, each one is linked to a particular request whereby current feeling of uncertainty might be reduced (Friend, Hickling 2005). These three types of uncertainty are synthetically described as follows:

- Uncertainties about working environment (UE), with a need for more information;
- Uncertainties about related decisions (UR), with a demand for better coordination;
- Uncertainties about guiding values (UV), with a request for clearer objectives.

UE are related to the assumptions should be made about external circumstances or trends; the concern is essentially to acquire additional information relevant to the decision-makers' working environment; this kind of uncertainty can be dealt with by responses of a relatively technical nature (such as surveys, forecasting exercises, costing estimations etc.), then the explorations are primarily of a technical and economic nature. UR concern the interconnections between different fields of decision and conflicting roles of decision-makers, with the need of negotiation decisions over the participants; this type of uncertainty demands for an exploration on the relationship between the current decision and others that seem to be interconnected, in order to collaborate and negotiate agreements about them. UV should influence the process, especially when decision-makers are seeking to compare alternatives and could emerge in the form of the conflicts between economy, safety and other criteria; this is the kind of uncertainty which requests for a more political response from, for example, a higher political authority.

Approaching uncertainties through the commitment package, as explained before, allows to reduce them with a set of explorations about the future decision space: «Assumes that complex decisions are typically interconnected and surrounded by different types of uncertainty... therefore: best way forward is to achieve balance between making initial commitments regarding the most pressing decision areas, and those left open until uncertainty is reduced» (Friend, Hickling, 2005).

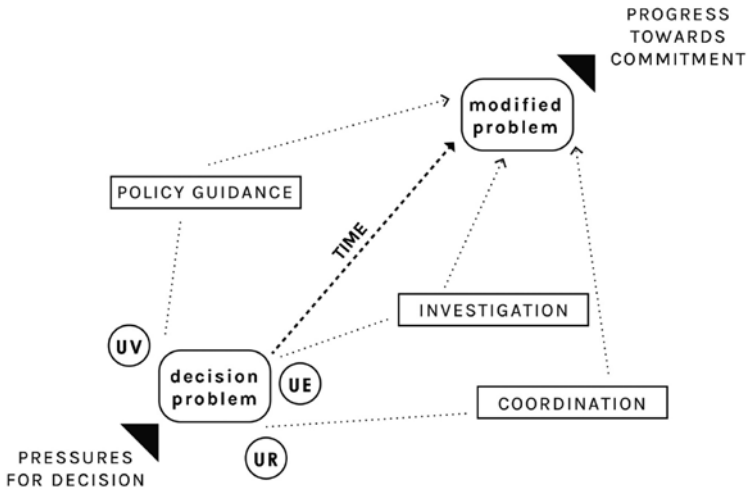


Figure 2 - Opportunities for managing Uncertainty through Time  
 Source: Adapted from Friend, Hickling 2005

Each of the three kinds of request can be considered as a different attempt to manage the current state of uncertainty with respect to what should be done about the problematic situation in order to reach some specific and agreed effects in the future. In fact, this classification can be intended as a basic taxonomy from which to develop actions and to take a series of decisions, under dynamic and changing circumstances (Sutton *et al.* 1986). In this way, it is possible to create a web of connections, implications, concatenations between decision-makers intentions and the possible consequences, that is the same in architectural design practice. Architectural design and urban transformation context deal with complex and ‘wicked problem’ with several implications; the aim of SCA, by defining different kind of uncertainties, can be to reduce it in many simple problems with a limited number of implications, that can be hypothesized – and then addressed – in their future effects and consequences.

*4. Facing urban uncertainty with SCA: the proposal of a fourth type of uncertainty about disruptive event*

Starting from the identification of different kinds of uncertainty in SCA, the aim is to explore some typical problematic implications and uncertainties in respect to the future in urban transformation and architectural design contexts, in current cities. By referring to the term ‘implications’, designers can consider «the predictable and unpredictable conditions of action, necessary to move from

a project into a real transformation of the world» (Armando, Durbiano 2017, our translation); dealing with implications in architectural design and urban transformation, we assume, is the same that tackling uncertainties.

Moreover, we argue that an additional category of uncertainty could be added to the traditional scheme of Friend and Hickling (2005), in order to consider the new – uncertain – challenges of future cities.

Starting from the definition of the three categories of uncertainty, we can first specifically define them for current urban/architectural realm (Table 2).

<b>Hard Operational Research</b>	<b>Soft Operational Research</b>
Problems formulation in terms of a single objective and optimisation. Multiple objectives, if recognised, are subjected to trade-offs on to a common scale	Non optimising: seeks alternative solutions which are acceptable on separate dimensions
Overwhelming data demands, with consequent problems of distortion, data availability and data credibility	Reduced data demands, achieved by greater integration of hard and soft data with social judgements
Scientisation and depolitization, assumed consensus	Simplicity and transparency, aimed at clarifying the terms of conflict
People are treated as passive objects	Conceptualises people as active subjects
Assumption of a single decision maker with abstract objectives from which concrete actions can be deduced for implementation through a hierarchical chain of command	Facilitates planning from the bottom-up
Attempt to abolish future uncertainty, and pre-take future decisions	Accepts uncertainty, and aims to keep options open for later resolution

Table 2 - The three categories of uncertainty for current urban/architectural realm

UE are generally related to the technical aspects of the plan/project. They can lengthen the implementation time and increase the costs of the intervention, but they are rarely the main cause of a complete stoppage of the operation. UR in urban and architectural realm are generally related to the little clarity in the division of decisions both between different public bodies and within the same body; and to proliferation of rules and operational tools. UV are gener-

ally related to the possible differences in the objectives between various levels of government, to the presence of territorial conflicts (mainly due to the imbalance in the distribution of costs and benefits, reaction to the dominant development model); they can deeply influence and/or completely stop a decisional process and, consequently, an action.

This consideration of the three different kind of uncertainty reflects the different steps (and documents/contracts) through which designers approach the issue of future, with the management of key uncertainties and all their related implications and requests, in a project (Fig. 3).

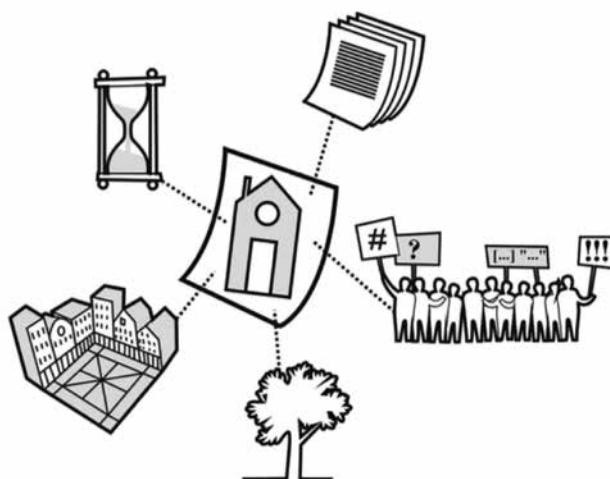


Figure 3 - The project as registration and translation of different implications  
Source: Armando and Durbiano 2017

The consideration of different possible answers and the consequent definition of ‘probable futures’ in a project can be a way of generating knowledge on how to tackle uncertainties and about the future itself, in order «to evaluate possible immediate consequences that action, taken in the face of future uncertainties, will have» (Khakee, Strömberg 1993). In this, it is assumed that a deeper understanding of the problematic situations and its uncertainties can significantly be instrumental in the identification of possible future courses of action).

Moreover, it can be hypothesized that – dealing with architectural and urban wicked problems – «a more structured approach in the process [...] could have an impact on the quality and the results of the project» (Todella *et al.* 2018); trying to investigate and explain the specific ways the project can produce effects on the real world, a schematization of the problems and uncertainties that could affect the future can help to address it (Lami, Tavella 2019).

The project of an architectural/urban transformation therefore has to do with some uncertainties and implications, in overcoming a series of approvals of different institutional order. We have highlighted how a project must overcome some administrative, cultural, technical assessments (see Table 2); moreover, it can be subject of related decisions, discussions, debates, etc. The different steps and approval criteria depend on the social and political context of the decision-making process and generally consist of a system of rules and practices that are sufficiently formalized and shared, and mediated by collective negotiation processes (Armando, Durbiano 2017). In fact, «the process of choosing strategically becomes more complicated where it involves elements of collective choice – of negotiation with others» (Friend, Hickling 2005) and more formal planning rules could become essential. The solution to be implemented – in order to overcome the surfacing uncertainties – must be shared and receive the appropriate authorizations, and the rules and conventions must necessarily be extended to all the figures involved in the transformation assuming a formalized consistency: in this way, «the project takes the form of a real contract» (Armando, Durbiano 2017, our translation). It means to move from the condition of simple ‘signs’ to that of cogent rules and obligations, inscribed in specific documents, considering the contract one of the fundamental constructive elements to carry out a project. The conditions interwoven through the ‘project-contract’ confer the power to overcome the uncertainties and undertake actions – to open a building site, to occupy a ground, to demolish a building, to fence a part of the city, to make noise etc.

These three types of uncertainties well coped with the ‘ordinary’ problems – and projects/contracts – of a modern city (when they were conceived) and still do with the contemporary ones. But there are new issues that pervade public and political debate about projections of uncertain futures. Current discussion on urban uncertainty is around climate change, infrastructural disruption, insecurity, pandemics, at local and global scales (Zeiderman *et al.* 2017). These unpredictable, unknowable or unmanageable issues are very closed to the notion of ‘black swan’ of Taleb (2007), and their character of uniqueness can justify the consideration if could be worthy to add a new category of uncertainty to the SCA scheme, the ‘uncertainty about disruptive events (UD)’.

UD can be catastrophic or just unknown in their effect, what distinguish them is their huge impact on the current situation. These events can be considered as a UD because they are rare, with tremendous impacts and generally unpredictable. What we argue is that the difference between the three “original” uncertainties of the model and the new one here proposed is not in the “character” (it can be related to elements belonging to the environment, to the related agendas, to the values), but in the quality of being totally extraordinary, sudden and with potential tremendous effects.

As for the first type of UD, the catastrophic ones, we can include:

- fluid uncertainty: «future hydrological events – like flood, drought, contamination and runoff – shape urban socio-political life today». The possible answers to this water related uncertainty can be ‘hard’ technical solutions or ‘soft’ social processes, where the first try to engineer out the risk and the latter recognizes that «urban uncertainties are inherent to the city’s socio-natural landscape» (Zeiderman *et al.* 2017);
- catastrophic urbanism, related to «actual and potential, real and imagined, past and future» catastrophic events (such as evacuations, high security perimeters fencing and barriers, Zeiderman *et al.* 2017). In this category we could consider also the migrants flows;
- uncertainty about urban health: future pandemics shapes the way urban spaces, populations and bodies are governed (Zeiderman *et al.* 2017);
- petro-urbanism: «the battle for oil resources is inextricably tied to uncertain urban futures, extending far beyond oil regions» (Zeiderman *et al.* 2017).

Alongside UD related to catastrophic events, two can be reported whose effects do not (yet) have a precise direction:

- Uncertainty about the presence of transhuman in the cities: in the hypothesis that the human body can (artificially) change, it could be necessary to evaluate a different relationship between human beings and the space/environment around them, and to identify principles and perspectives that humanity could have to take;
- Uncertainty about the smart cities: divergent outcomes could exist about how new urban technologies can affect the average citizen’s life.

These events, considered as a UD because rare, with huge impact and generally unpredictable, request specific considerations about the way to consider them in a model. The very first answer that can be given to this type of uncertainty is the choice of how to face the disruptive event, by an adaptive attitude or the resilience, or with an “antifragile attitude” (Taleb 2013) (Fig. 4).

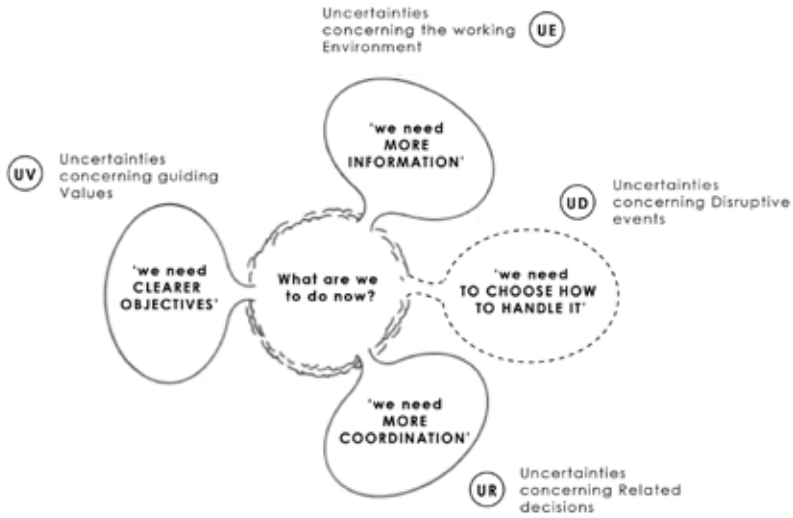


Figure 4 - Proposal for one more Type of Uncertainty in Decision-Making

### 5. Conclusions and further developments

SCA, developed since the late 60's, is a method meant to deal with operational decision in a strategic way, to manage different sources of uncertainty in decision-making process (Friend 1970; Friend, Norris 1988; Friend, Hickling 2005). In order to investigate the role of the future in architectural practices, we focus on the way SCA makes use of some specific devices, codes and techniques to address – not only but also – architectural and urban design problems, in which the issue of future and how to deal with it is always present and promotes everyday practice. By focusing on the way SCA approaches the issue of future, a reflection is carried out on the way of structuring the process, then of considering all the related implications and of managing key uncertainties. A common premise is in the way SCA scholars and designers consider the nature of the problem and its implications; in fact, it is assumed that a deeper understanding of the problematic situations can significantly be instrumental in the identification of possible future courses of action (Khakee, Strömberg 1993; Armando, Durbi-ano 2017). The consideration of different possible answers and the consequent definition of 'probable futures' can be a way of generating knowledge about the future, in order «to evaluate possible immediate consequences that action, taken in the face of future uncertainties, will have» (Khakee, Strömberg 1993).

It is evident that these similar 'managements of the future' presuppose to abandon a 'mystic' consideration of the future itself and future studies (Khakee, Strömberg 1993); the belief is that a broad analysis and problem structuring

of the changing process can improve the designers' and/or decision-makers' knowledge and understanding of the process itself, with the aim of oversighting future actions. Moreover, it can be assumed that – dealing with architectural and urban wicked problems – «a more structured approach in the process of choosing alternative transformations could have an impact on the quality and the results of the project» (Todella *et al.* 2018). Trying to investigate and explain the specific ways the project can produce effects on the real world, a schematization of the problems that could affect the future can help to address it. We thereby suggest that designers' consideration of the interactions and implications connected to each specific future solution in a project – as in SCA management of uncertainties – can be a useful framework to direct its effects on reality. By referring to the term 'implications', designers can consider «the predictable and unpredictable conditions of action, necessary to move from a project into a real transformation of the world» (Armando, Durbiano 2017); dealing with implications in architectural design and urban transformation, we assume, is the same that tackling uncertainties in SCA application. By designing and comparing alternative scenarios, it opens up to uncertainties about the future, trying to consider and anticipate the implications that every choice produces, in all their possible combinations. The set of conditions acting in a project registration (people, things, roles, institutions, events, rules) can be extended a lot, taking into account the plurality of instances and entities that have been incorporated during the process, to which it must respond with a solution.

Prior work has documented how SCA deal with the future in the specific realm of urban planning in current cities, taking into account the three different levels of uncertainties that the method aims to manage (UE, UR, UV). We suggest that these three types of uncertainties are referred to the 'ordinary' problems of modern and contemporary cities; the project of an architectural/urban transformation has to do with this kind uncertainties and implications, in overcoming a series of approvals of different institutional order. The rules and conventions to receive the appropriate authorizations and to exceed the three different types of uncertainty in SCA are shared and clear, in these cases in which the project – in each step – takes the form of a contract (Armando, Durbiano 2017).

Instead, this categorisation doesn't conceive some new – uncertain – challenges of future cities (Taleb 2007), that pervade public and political debate on urban uncertainty around climate change, infrastructural disruption, insecurity, pandemics, at local and global scales (Zeiderman *et al.* 2017).

In this study we argue that this character of uniqueness can suggest the exploration of a new category of uncertainty in the SCA scheme, the 'uncertainty about disruptive events (UD)', a kind of catastrophic or just unknown in their effects.

As far as we know, this is the first attempt to investigate the possibility to extend SCA, in order to include this kind of events, rare, with huge impact and unpredictable in their outcomes. However, there is a need to go in depth

in this direction, in order to understand how to handle these disruptive events in the regime of SCA method.

Moreover, future work should include a deeper investigation on a possible system of rules and practices to project facing this new kind of urban uncertainty, in order to identify a series of criteria and documents that could built projects/ contracts strong enough to overcome it.

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