

# **A PROPOSED METHOD FOR ANALYZING AND DEALING WITH ARCHITECTURAL PROBLEMS (ADAP)**

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## **INTRODUCTION**

Problem solving is an activity that has a history as old as the human race. Jonassen states that problem solving is generally regarded as the most important cognitive activity in everyday and professional contexts. Most people are required and rewarded for solving problems<sup>1</sup>. In different built environments, there are many architectural, urban and planning problems. Solving or finding the suitable approach for solving these problems is one of the important roles of the architect. But in many cases, finding the suitable approach for analysing and solving a problem is so difficult.

Many studies present particular methods, methodologies, tools for analyzing specific problems in a specific aspect of the architectural field. But, there isn't a general tool that architects can use for analyzing and dealing with architectural problems.

In this paper the researcher seeks a method for dealing and analyzing the architectural problem. It is clear that good analyzing of any problem presents the keys and the suitable approaches for solving it.

For all the above mentioned reasons, this research seeks answers to a central question:

***“What is the suitable method for analyzing and dealing with architectural problems?”***

So the research presupposes that it is possible to develop a tool (method) for good analysis of an architectural problem. That tool can help the architect to know the roots and the reasons of a problem.

The main aim of this research paper is proving or disproving the hypothesis that answers the research question through presenting a proposed methodology for Analysing and Dealing with the Architectural Problems (**ADAP**).

To achieve that aim, the study depends on the deductive methodology.

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<sup>1</sup> Jonassen, David H., 2000.

## 1. THE ARCHITECTURAL PROBLEM

There are many definitions for the word "problem"<sup>2</sup>. These definitions depend on different points of view. Studies in the field of management define the problem as "unclear situation that needs to clarify", "the difference between the existing situation and what should exist" or "straying of something from the right path or the aimed path"<sup>3</sup>. Jonassen states that there are only two critical attributes of a problem. First, a problem is an unknown entity in some situation (the difference between a goal state and a current state). Those situations vary from algorithmic math problems to vexing and complex social problems. Second, finding or solving for the unknown must have some social, cultural, or intellectual value. That is, someone believes that it is worth finding the unknown. If no one perceives an unknown or a need to determine an unknown, there is no perceived problem<sup>4</sup>.

All shown definitions and others reflect one main meaning that there is a matter, situation or thing that needs attention and needs to be dealt with in order to correct its situation.

In architecture, the matter or the situation is the built environment with its details and different levels.

So it is possible to say that **the architectural problem is a defect in a part of the built environment that causes trouble for people that carry out different activities within this environment.**

The architectural problem has special characters; it is a problem in the built environments that people live, work in and do any other activities. It may affect the environment or its different components and people's behavior.

### 1.1. SENSATION OF THE ARCHITECTURAL PROBLEM

There are many ways to sense an architectural problem. The first and the direct source of sensation is the coexistence with a problem. The other sources of sensations are information media, questionnaires, and commandment to documenting or solving a specific problem. Also, some problems can be expected and inducted due to logical reasons. The last type of problems is the assumed problems.

In some problems, it is required and important to minimize feeling this problem for many reasons like minimizing people disturbance until solving the problem or finding the suitable solution. Otherwise some problems need to maximize feeling them in order to stimulate or warn the society or people of the expected effects of the problem upon them. The main tool to maximize feeling of the architectural problem is the information media (like TV, newspaper, magazines) the other tools like researches reports and are important; but without information media, they lose their influencing power.

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2 According to Cambridge dictionary, problem is: A situation, person or thing that needs attention and needs to be dealt with or solved. - A question in mathematics which needs an answer. - An unwelcome or harmful matter needing to be dealt with. - A thing that is difficult to achieve (<http://dictionary.cambridge.org/>). According to Oxford dictionary<sup>2</sup>, problem is: An unwelcome or harmful matter needing to be dealt with. - A thing that is difficult to achieve. - An inquiry starting from given conditions to investigate or demonstrate something (Physics & Mathematics) (<http://www.askoxford.com>). Also there is many other meaning like: problem is: A state of difficulty that needs to be resolved. - A source of difficulty. - A situation that presents difficulty, uncertainty.

3 Hanafy, Abdelghaffar & Keryakes, Rasmia, 2000.

4 Jonassen, David H, 2000.

## 1.2. CLASSIFYING THE ARCHITECTURAL PROBLEMS

Architectural problems can be classified in six classifications according to:

- The existence of the problem: (existent, expected or presupposed (theoretical) problem).
- The time of the problem: (old, contemporary, temporary or continuous problem).
- The place of the problem: (local, province, state or global problem).
- Influenced people: (personal, collection, mass, social or national problem).
- The type of architectural work (planning, designing, redesigning, developing, executing, conservation, documenting, reservation or reusing).
- The size of the built environment (room, residence, building, street, neighborhood, region, city, Province, state or whole world).

### 1.3 Sides of the architectural problem

The architectural problem has three sides; place of the problem, source (reason) of the problem and the people who are influenced by this problem. These three sides represent the triangle of the problem (fig. 1).

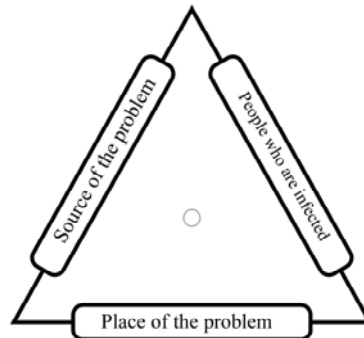


Fig.1: Sides of the problem represented in a triangle shape (triangle of the problem)

#### 1.3.1 PLACE OF THE ARCHITECTURAL PROBLEMS

It begins from the smallest unit of the built environment up to the whole globe (room, residence, building, street, neighborhood, region, city, Province, state or whole world). It is probable to have a problem. The problem may be in an element or more in one of these environments at any of these levels.

#### 1.3.2 PEOPLE WHO ARE INFLUENCED BY THE PROBLEM

There are three types of people who deal with the built environment. The first type is the users of this environment that live, work and do all life activities. The second type of people is those who are passing through this environment or spend a short time as a guest.

The other types of people are the owners of this environment/s. They are limited and fixed in number.

#### 1.3.3 SOURCES OF THE ARCHITECTURAL PROBLEMS

The problem solver should know exactly what the real source of his problem is. Knowing the real source of the problem is an important step in dealing with any problem.

There are many sources for the problem. Most of them cause defect or failure in the essential job of the six members of the architectural work: architect, financier, user, contractor, superintendence and control organizations and organizations. The other sources are natural catastrophes like earthquakes, flood and other natural phenomena. Also there are other sources for architectural problems like governmental plans for development and ambition of the future (fig. 2).

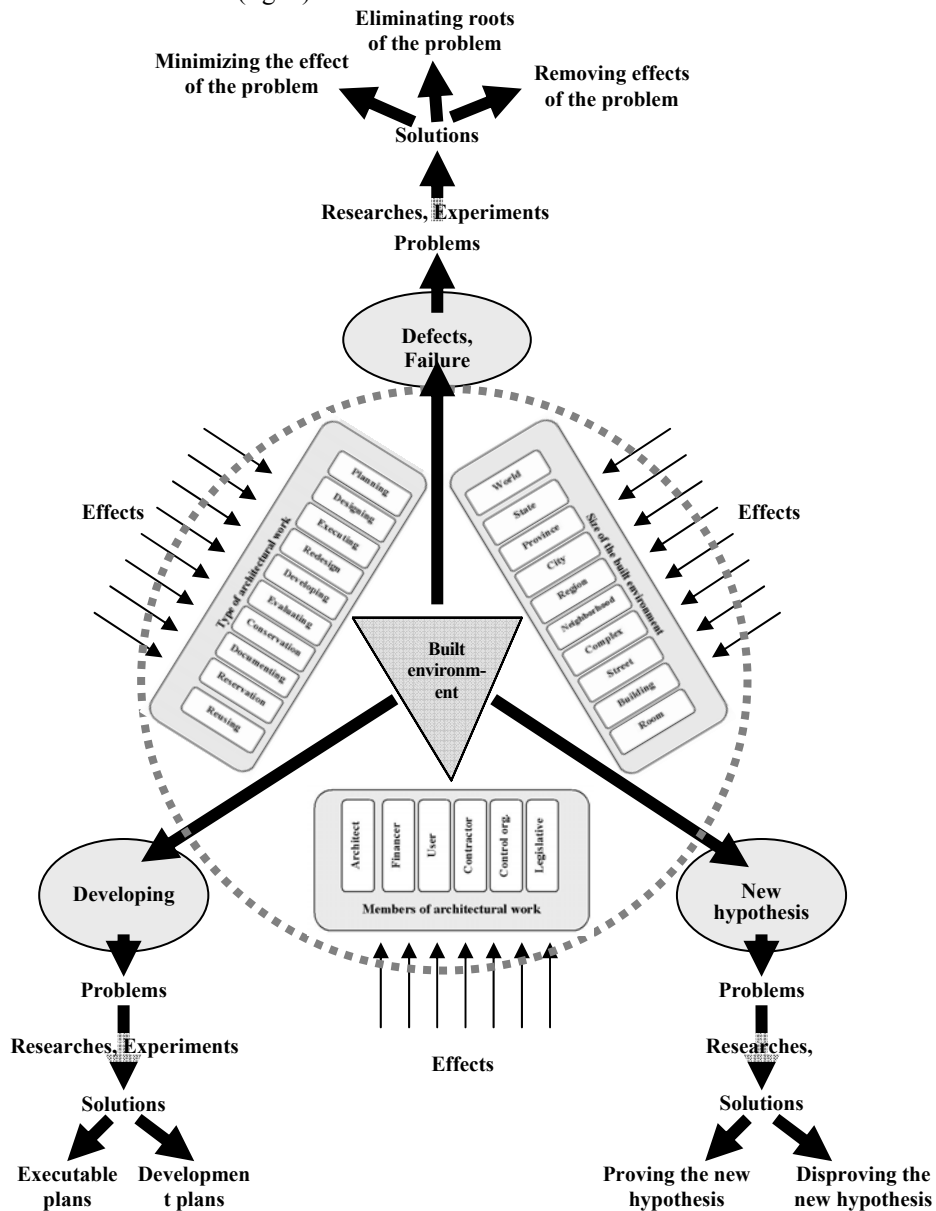


Fig. 2: Sources of the architectural problems

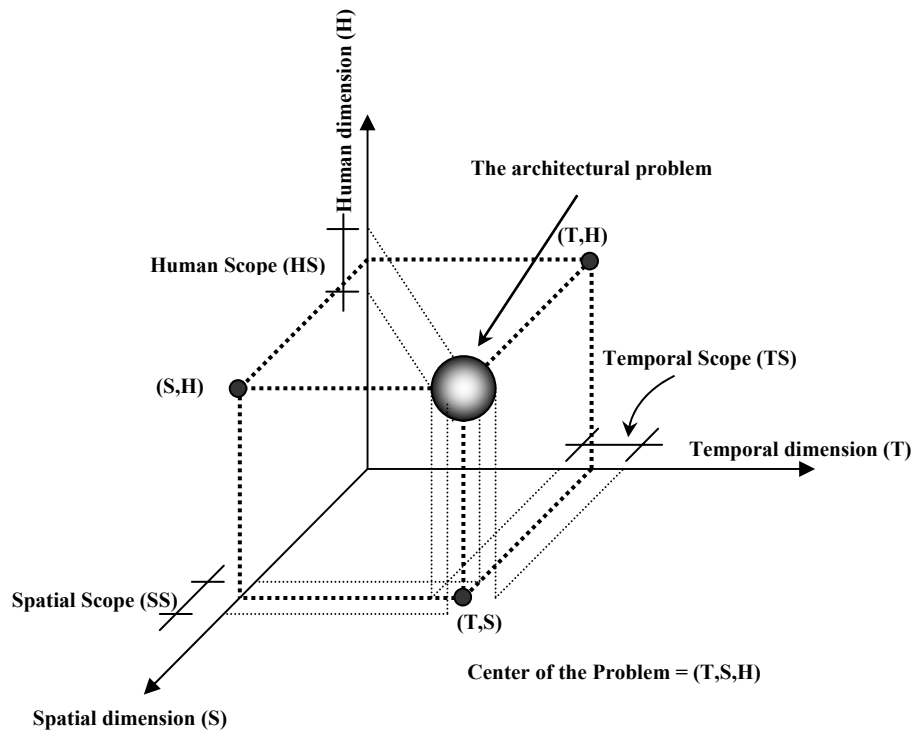
All these sources present a lot of architectural and built environmental problems (either existent, expected or presupposed problem).

The architectural design and planning process are considered as types of architectural problems that have special characters and special aims.

#### 1.4 SCOPES AND COORDINATES OF THE ARCH. PROBLEM

It is important to specify the scope of any problem. In architecture, there are three main scopes (ranges) for the architectural problem. These scopes answer three questions about WHERE is the problem, WHEN it happened, and WHO are influenced by it.

This means that the architectural problem have a temporal scope, spatial scope and human scope. So it is possible to represent the architectural problem as an object in a treble coordinative system. In this system, the "T" coordinate represents temporal dimension that begin with the beginning of time (0) and ends with recent date or a specific date in the future (in case of expected or presupposed problems). The "S" coordinate represents spatial dimension (from most small, local space up to the whole world), and the "H" coordinate represents the human dimension of the problem (from 0 age up to max. age rate). Point (T,S,H) represents the center of the problem<sup>5</sup> (fig.3).



**Fig. 3: Scopes and coordinates of the architectural problem**

<sup>5</sup> For example: if we now have a problem in designing basic children schools that were built before 30 years in Assiut city, that means the T dimension is the last 30 year, the S dimension is Assiut and the H dimension is children.

## 2. Solving the architectural problems

Problem solving is a set of activities designed to analyze a situation systematically and generate, implement, and evaluate solutions.

Problem solving methods (PSMs) are domain-independent processes, which specify patterns of behavior that can be reused in applications. In particular, very little progress has been achieved on foundational and methodological issues. Existing libraries of PSMs lack a clear theoretical basis and only provide weak support for the method development process, usually in the form of informal guidelines<sup>6</sup>

### 2.1. PROCESS OF PROBLEM SOLVING

Researches that deal with this matter present some common guidelines for the steps of solving problems. For example, Galal presents six steps for solving a problem; 1) problem definition, 2) identifying options, 3) analysis of options, 4) Selecting the suitable option, 5) implementing the solution, 6) evaluating the solution<sup>7</sup>. Others may formulate the six steps into 5 : 10 steps depending on gathering two steps together or splitting one step into two or three steps (for example: Salem & others<sup>8</sup>, 1995).

Otherwise, Dunbar (1998) states that for certain problems it is possible to jump from one part of a problem space to another by passing many of the intermediate states. One heuristic for jumping from one part of a problem space to another is to reason analogically. If the problem solver has solved a similar problem in the past, she or he can go directly to the solution by mapping the solution of the old problem onto the current problem<sup>9</sup>.

One of the trials for systemizing the problem solving process is the guide presented by IPTV (2003)<sup>10</sup>. The method consists of three stages that include seven steps in the form of questions that need to be answered (fig. 4).

Placek presents a "mindmap" for steps of solving problems. It consists of 5 steps that begin with comprehending the problem, formulating the options, planning the strategy, executing the strategy and evaluating the solution (fig. 5)<sup>11</sup>.

### 2.2. MODELS USED FOR SOLVING PROBLEMS

Murthy stresses the role of modeling in solving problems. He said that many different kinds of models have been used. These include physical (full or scaled) models, pictorial models, analog models, descriptive models, symbolic models, and mathematical models<sup>12</sup>. In addition, Jonassen clarifies that there is a popular problem solving model, the **IDEAL** problem solver describes problem solving as a uniform process of **I**dentifying potential problems, **D**efining and representing the problem, **E**xploring possible strategies, **A**cting on those strategies, and **L**ooking back and evaluating the effects of those activities. Although the **IDEAL** model assumes that these processes are applied differently to different problems, no explicit suggestions are made for how to do this<sup>13</sup>.

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6 Fensel, Dieter and Motta, Enrico ,1998.

7 Galal, Ahmed F., 1996.

8 Salem, Fouad A. & others , 1995.

9 Dunbar, Kevin, 1998.

10 "Solving a Problem", 2003

11 Placek, Timothy D ,2007.

12 Murthy, D.N.P., Xie, Min and Jiang, Renyan , 2004.

13 Jonassen, David H. 2000.

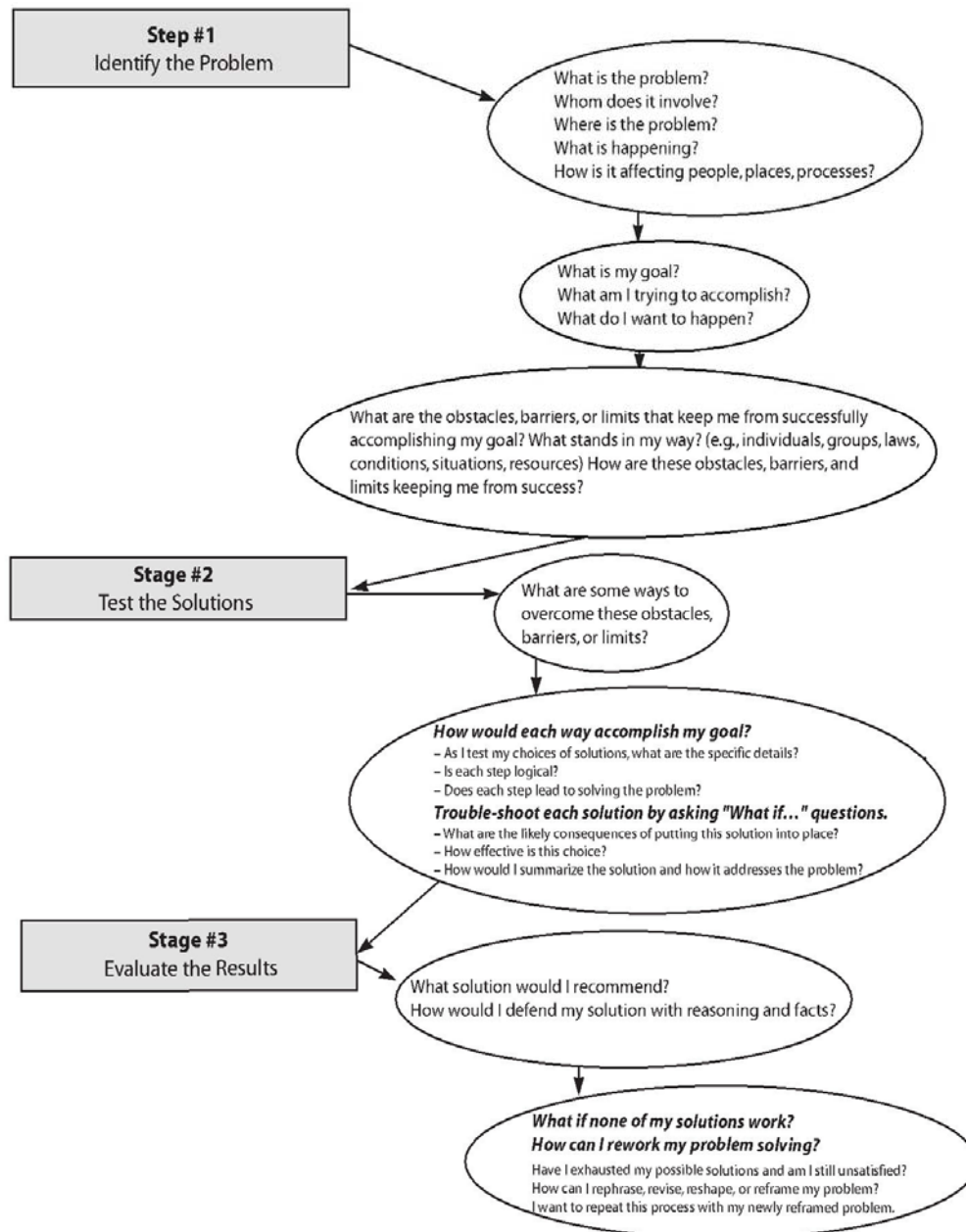


Fig. 4: IPTV method of solving problems<sup>14</sup>

<sup>14</sup> "Solving a Problem", 2003.

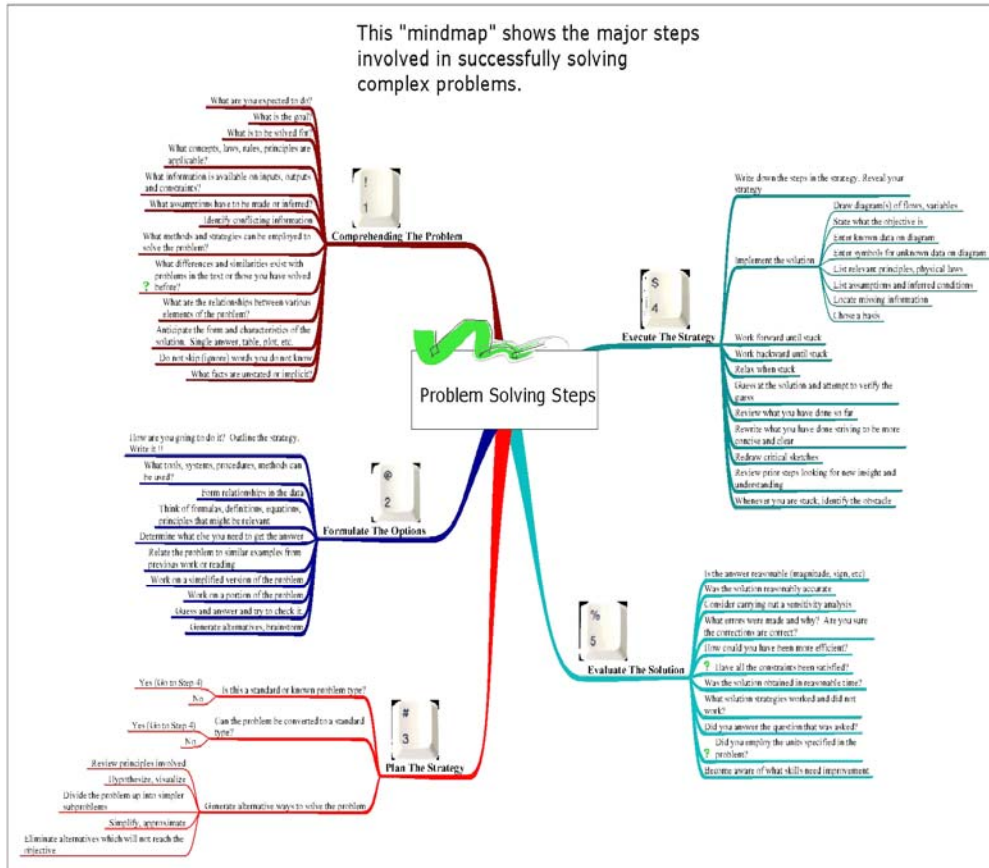


Fig. 5: Placek "Mindmap" for successfully solving complex problems<sup>15</sup>

### 2.3. METHODS OF DEALING WITH THE ARCH. PROBLEMS

In architecture, there is no difference in the main steps of the problem solving, but there is a difference in details or much more in-between steps. A problem solver uses some tools during the process like modeling (computer, mathematics, mass, simulation), methods or methodologies. All these tools are used in architecture in different built environment problems, for example, One of them is *"The simplifier integrative method for dealing with complicated problems of architectural and urban design process"*<sup>16</sup> that deal with the design process as a kind of problem in the field of architecture (fig.6). Another example of particular methodologies, the methodology that was derived by the author of this paper for

<sup>15</sup> Placek, Timothy D , 2007.

<sup>16</sup> Abdellatif, Mahmoud A., 1989.





problem. Each step consists of some questions, which help in executing the step and concluding good results.

Method ADAP consists of 10 steps as follows:

▪ **Step 1: Comprehending and documenting the Problem:**

In this step, the problem solver must identify and comprehend the problem very well. One of the important procedures in comprehending the problem is documenting its aspects using photos, videos, documents, reports, records or any suitable tools<sup>19</sup>. Good comprehending requires seeking answers for the following questions:

- What is the problem in short?
- Is the problem related to my specialization?
- Do I have the interest to solve this type of problems?
- What are the aspects of the problem?
- What is to be solved?
- What assumptions have to be made or inferred?
- What facts are unstated or implicit?
- What is my goal?

▪ **Step 2:Collecting Data about the problem**

It is recommended that the problem solver collects all data about the problem and its related circumstances. Data can be arranged as answers for the following questions:

- Where is the problem?
- When it began to appear?
- How it grows through time?
- When it became clear and effective?
- Did it happen before in the same environment?
- Did it happen before in another place?
- Who are influenced by the problem?
- Why the problem happens?
- Who can assist in analyzing and solving the problem?

▪ **Step 3:Analyzing the problem**

It is an important step, good analysis leads to good recognition of the roots and sources of the problem. Questions that need to be answered during this step include:

- Is there any obscurity in the collected information?
- Is there any conflicting information?
- Are there any relationships between data?.
- What is the history of the problem?
- What are the elements of the problem?
- What is the main element? What are the secondary elements?
- What are the relationships between various elements of the problem?
- What are the different scopes of the problem? Is it limited or not?
- What is the main source (root) of the problem (architect, user, owner, contractor .....etc)?

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<sup>19</sup> One of the most important steps in dealing with the problems is how to document the architectural problem for confirming the existence of the problem, its sides and its influence against the built environment, architecture, people and their activities. Information media, academic researchers, people who are affected, representative, member of parliament have the right and the authority to document a problem. They use many tool for documenting the architectural problem like reports, official records, scientific studies video programs and articles.

- What are the secondary sources (roots) of the problem?
- Is this a standard or known problem type?
- Which of the problem roots can be under control?
- Do people affected by the problem have any suggestions or recommendations for solving the problem?

▪ **Step 4: Defining the suitable approach of solution**

There are many approaches to solve any problem like administrative decisions, experiments, research papers, and scientific dissertations. In this step, the problem solver should select the suitable approach according to the availability of all requirements of the selected approach. There are some questions and statements that may assist in selecting the suitable approach. The questions and statements are:

- What do you expect to do?
- What is the aspiration of people who are influenced by the problem?
- Can the problem be converted to a standard type?
- What differences and similarities exist in problems in publications or those you have solved before?
- What approaches and ways can help in solving the problem?
- Evaluate the different approaches according to:
  - > The suitable time to finish all procedures of solving the problem.
  - > The availability of required equipments in every approach.
  - > Efforts needed for implementing the approach.
- Define the appropriate approach to solve it and write your reasons.

▪ **Step 5: Selecting the suitable alternative for solving the problem**

After selecting the suitable approach, you will find that it provides you with many alternatives for dealing with the problem. Architects should make a brainstorming for all probabilities and solution alternatives. Here, there are some partial procedures like:

- Relate the problem to similar examples from previous works or readings
- Define concepts, laws, rules, principals applicable in the selected approach
- Think of formulas, definitions, equations, principles that might be relevant
- Work on a simplified version of the problem
- Work on a detailed version of the problem
- determine in what level you will solve the problem
- Generate alternatives, brainstorm.
- Filter alternatives according to:
  - > Goals.
  - > Sufficient time.
  - > Simplicity.
  - > Easiness to execute.
- Select an alternative for solving the problem (make a decision).
- Do you think that your decision is the best?
- In what percent it is compatible with the aspiration of people?

▪ **Step 6: Checking compatibility between the selected alternative and the problem**

It is important in this step to make a check for the compatibility between the original problem and the suggested solution. Points of check are listed below:

- Check if the selected alternative is related to the problem.
- Check that you have data, information and all needed details for executing the selected alternative.
- Be sure that the selected alternative is oriented towards sources and aspects of the problem.
- Check if the selected alternative falls into the selected approach.

- Check if there is a better alternative than the selected one.
- If everything is ok, go to step 7 or repeat the process again.

▪ **Step 7: Setting an action plan for executing the selected solution**

The problem solver begins to set an action plan for executing the different parts of the solution and its requirements. Steps that needed to made during action planning include:

- Dividing the solution into some stages and sub-stages.
- Describing tools, systems, procedures, methods used in the process.
- Setting the timetable of executing the solution.
- Defining who will manage the executing process.
- Defining who will observe the executing process.
- Setting an emergency committee.
- Writing down the strategy.
- Checking the rightness of procedures from the first step up to final strategy.
- Setting the final script of executing the strategy.

▪ **Step 8: Studying the expected effects of the action plan**

- In this step, the problem solver assumes that he executes the plan and expects different reactions from many points of view.
- Assume that every stage have a trouble.
- Determine the expected trouble, its sources and its reasons.
- Prepare partial scripts for dealing with the expected trouble.
- If the expected troubles and obstacles are satisfied, go to the ninth step to execute the strategy.
- If the expected troubles and obstacles are too much, that means the selected solution is not good and needs adaptation.

▪ **Step 9: Implementing the solution**

- Be sure that every thing is ready (tools, persons, materials .....etc.)
- Be ready for expected and unexpected troubles.
- Execute your action plan step by step.
- Pause process after each step to make a partial evaluation for the steps that were done before.
- Document the process using photos, videos, reports.....etc.

▪ **Step 10: Evaluating the solution**

The importance of this step is to give the problem solver a feedback about the rightness of the solution decision and implementing strategy to improve the way of dealing with the problem, selecting the suitable solution and/or strategy of implementing the selected solution. Questions that need to be answered during the evaluation process include:

- What are the obstacles and troubles you faced during executing the strategy?
- Are there any unexpected obstacles or troubles?
- Are there scripts for dealing with it?
- Was the solution reasonably accurate?
- What errors were made and why? Are you sure the corrections are correct?
- What is the percentage of realizing the goals?
- Was the solution obtained in suitable time?
- Become aware of what skills need improvement
- How could the solution have been more efficient?

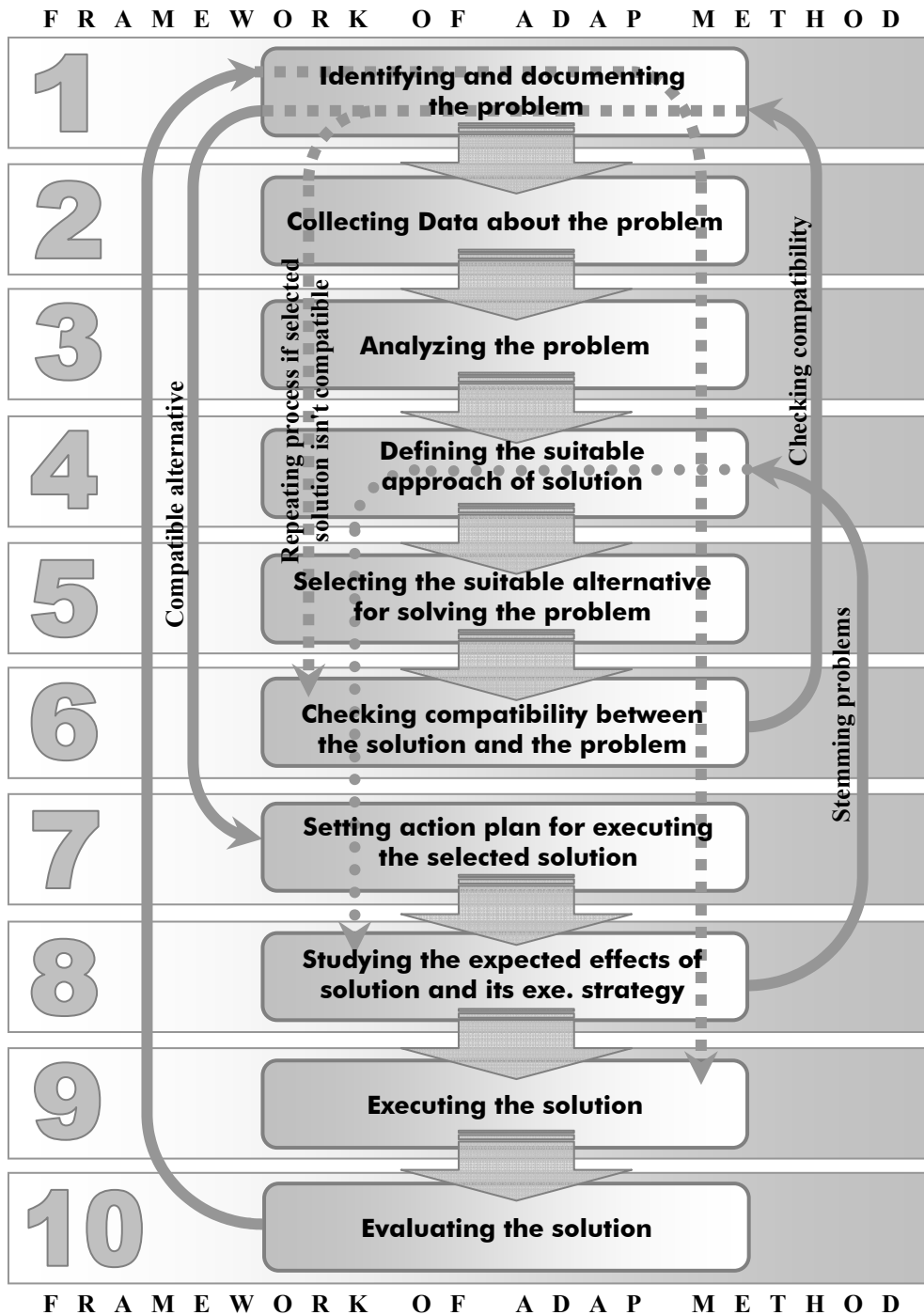


Fig. 7: The frame work of the proposed methodology (Methodology ADAP) for analyzing and dealing with Architectural problems.

## 4. DISCUSSION

Dealing with the architectural problems has common steps between all problem solving methods in the different fields and aspects of life. The difference is concentrated in the way of analysing and discovering the roots and reasons of the problem shown in the third step of the proposed method. There are some differences in the other steps in particular points.

No doubt that deriving the alternatives of solution is a mental process that depends on the creativity of the problem solver and his ability to think and to make a good brainstorm.

In many times, we jump to a proposed solution and begin to implement it without passing through the logical steps (somebody called this process "creative problem solving"). Such cases lead to problems in implementing process that we have the possibility to avoid it if we pass through the defined steps. But, it is possible to use the proposed method to evaluate the solution before implementing it.

## CONCLUSION AND FUTURE WORK

The research presents a proposed method for **Analysing and Dealing with the Architectural Problems** (method **ADAP**). Method ADAP presents a practical answer to the central question of the study that asks about the suitable method for analyzing and dealing with architectural problems. **As a result, the research proves the hypothesis and realizes its main aim.**

Otherwise, method ADAP presents a scientific contribution in field of dealing with the architectural and built environment problems.

As a future work, it is possible to reform the suggested method in a form of table and questionnaire to facilitate the use of the method. Otherwise, studying the possibility to computerize the method ADAP and how computer can assist in the process of deriving or evaluating different solutions for architectural problems. In another direction, it is easy to extract from method ADAP a method for evaluating the architectural problem solutions.

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