



## Applying NIMSAD framework to evaluate the performance of ETHICS and SSADM methodologies

Mr. Nabil A. Algshat

Assistant lecturer at Computer Department, Faculty of Art and Science - Badr , Libya

### Abstract

Nowadays, the information system methodology is lifeblood of any successful project. The success is based on the quality of information and its technology over the globe. This could rely on the development and operation of computer based systems.

To assure that you achieved the goal, there should be a perfect and ideal selection of the methodology, and quite simply it matches your needs. However, there should be some researchers have been written about NIMSAD, SSADM and ETHICS and with no doubt much will be written in the future. The purpose of this paper is to conducting a comparison between two methodologies effectively. Besides, the implementation of

NIMSAD framework will take an integral part in this paper. Consequently, the implementation will illustrate the strength and weakness points of both methodologies. Eight principals' steps of NIMSAD will be examined to demonstrate various aspects of EHTICS and SSADM methodologies. This, however, will help to ensure the efficient performance which is the main goal of this work.

### Key words

NIMSAD, Framework, SSADM, ETHICS, Methodology, Information System.

### 1-Introduction

It appears that the evaluation phase is a significant part of performance improvement of any systems and project. In our daily life, specially, the projects or systems which we do, indeed they require us for evaluating in to obtain tangible outcomes. We can simply define the evaluation as reflective of the work when we examine and check process and progress in some cases and to make judgement on what we have done yet, as well as there should be a simple question, is our effort going fine?. If not, then we need to check again and making some changes until we notice explicit success. In doing so, we need special tool carrying out the efforts in right path. This tool is evaluation framework; the main purpose behind this framework is to assist us for understanding the evaluation of any process for the current system in which we spend time and efforts.

The framework is used also to evaluate some methodologies which are important for implementing in a system and choosing one of them to apply it on a specific system. On the other hand, two methods or approaches can be applied or being adopted according to the selection of a framework (Niaki, 2001).

Indeed, there are variety of frameworks and methodologies, and their use depends on who will use the methodology and how he will use it and what kind of framework he will use to evaluate the current methodology which is being applied on any system, project or any intended process.



First of all, methodologies are as the following:

- 1-**STRADIS** stands for (Structured Analysis, Design and Implementation of Information Systems)
- 2-**YSM** stands for (Yourdon Systems Method)
- 3- **SSADM** stands for (Structured Systems Analysis and Design Methodology)
- 4-**MERISE** stands for (Method of Study and Realization for Computer Systems Enterprise)
- 5- **JSD** stands for (Jackson Systems Development)
- 6- **ETHICS** stands for (Effective Technical and Human Implementation of Computer-based Systems)
- 7- **SSM** stands for (Soft System Methodology)
- 8- **RAD** stands for (Rapid Application Development) Etc.

Second of all, frameworks, there are many types of these frames they are as the following:

- 1-**NIMSAD** acronyms (Normative Information Model-Based System Analysis and Design)
- 2-**Episkopou and Woodharper**
- 3-**Avison and Taylor**
- 4-**Fitzgerald and Avison**

According to the mentioned frameworks as can be seen there is no “one size fits all” above methodologies or approaches. Therefore, the analyst, evaluator or manager can select one of the frameworks that can be more appropriate than others and applying it to evaluate the methodology, in order to save time, cost and obtaining desired outputs from this evaluation.

The purpose of this paper is to examine how to applying NIMSAD on two methodologies or approaches (ETHICS and SSADM) after making a comparison and contrasting on the performance of both, as well as gaining knowledge about their different aspects before, during and after their process till we able to make final decision whether both are the same or there is a recommendation for one of them which could be owing to its implementation.

## 2-NIMSAD

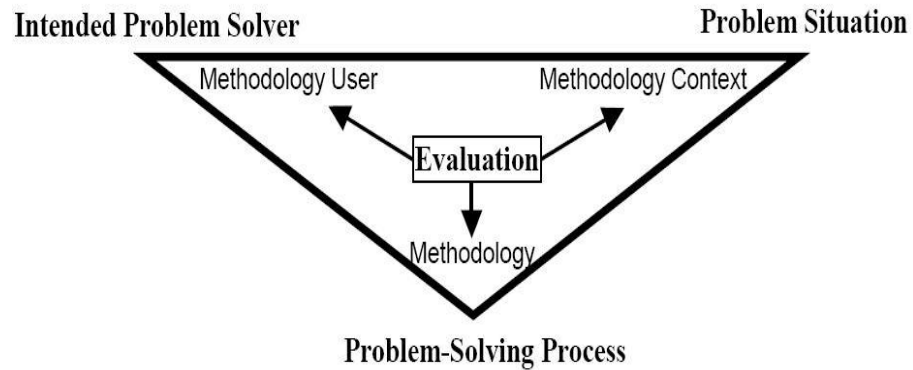
NIMSAD stands for (Normative Information Model-based Systems) it is a framework that aims to understand the problem (Jayaratna, 1994). It concerns about existing problem ,as well as, aspects of the problem solving process(physical and

logical) take place in this tool, in order, to understand the ‘problem situation’, then evaluate and re-evaluate it, to obtain desired outcomes . Besides, NIMSAD aims to develop the professional skills, critical thinking, knowledge and awareness of who intend to use this framework in his/her daily life work. It also helps in the evaluation of methodologies or methods with their forms, steps, phases and stages etc. In addition, the conclusion of this work can be valuable. Moreover, It can be drawn by users of framework after its successful apply on any methods.

## 2.1 Rational

As Jayaratna stated, NIMSAD comprises four important elements:

- 1- The ‘problem situation’ (methodology context)
- 2- The ‘intended problem solver’ (methodology user)
- 3- The ‘problem solving process’ (methodology)
- 4- Evaluation of the above three elements see(Figure1)



**Figure1 NIMSAD FRAMEWORK (Jayaratna,1994)**

### 2.1.1 Problem situation

The ‘problem situation’ element of NIMSAD framework, it represents the methodology context of specific problem. Furthermore, many factors can contribute to the comprehension of the properties, attributes and characteristics of concerned situation, as well as, through the environment, that framework operate in it. These factors could have direct and indirect influence on the definition of the problem.

The factors are listed as follow:

- Information
- People
- Process
- Technology
- Structures



Together, the above elements of factors can remarkably contribute to illustrate the situation of concern. Moreover, many possible interpretation of 'action world' can be shaped.

### 2.1.2 Intended problem solver

'Intended problem solver', is the methodology user, it also an essential element of NIMSAD framework. In addition, the methodology user can be; for example: the owner of problem, system analyst, consultant or victim of the problem, etc. However, they could be inside or outside the organization or the situation of problem, as well as, the recommendation for the best solution can be contributed by one of them owing to the responsibility, which is one of them should have it toward the problem situation or the matter of concern.

In whatever way, the characteristics of methodology user are playing an essential part of this element. On the other hand, in this element of NIMSAD , the focus will be on the role instead of the person.

### 2.1.3 Problem solving process

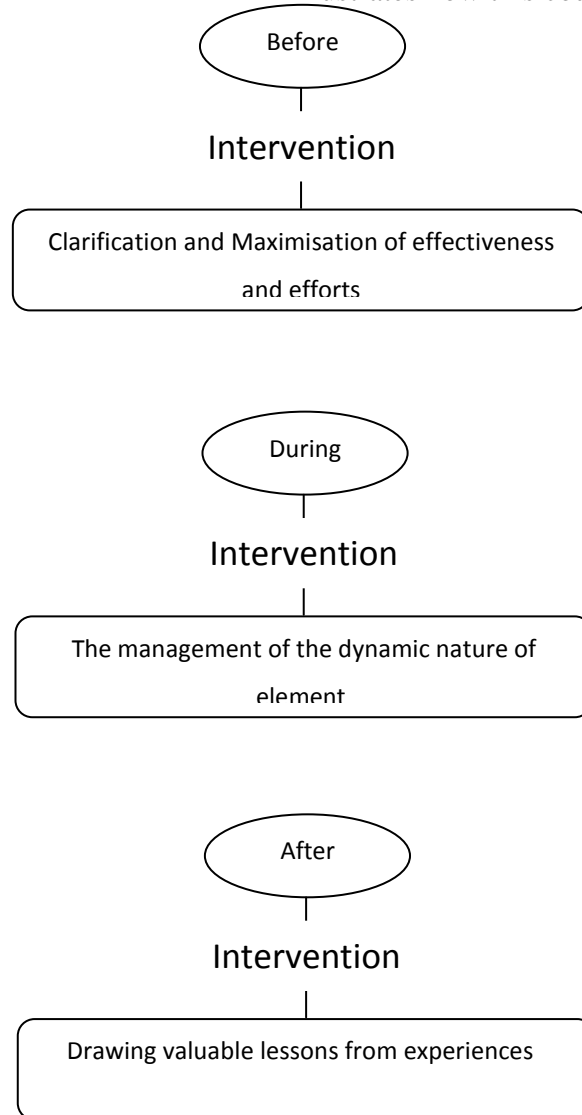
'Problem solving process' or the methodology is also one important element of NIMSAD framework. It concerns how the problem is going to be solved and show us whether the used method or approach is adopted by the methodology user to transform the situation in right way. This element includes three phases and each phase has stages. The next lines will illustrate what are these phases and their stages.

- Phase1 (problem formulation) and its stages:
  - 1- Understanding the situation of concern
  - 2- Performing the diagnosis
  - 3- Defining the prognosis outline
  - 4- Defining problems
  - 5- Deriving notional systems
- Phase2 (Solution design) its stages:
  - 1- Performing logical design
  - 2- Performing physical design
- Phase3 (Design implementation) its stages:
  - 1- Implementing the design

These phases together with their stages can provide a well structured method to the actions of problem solving. According to the above findings many possible and suitable solution can be identified with consideration of time, space and cost as well.

### 2.1.4 Evaluation

The last NIMSAD framework's element is the evaluation of the other three elements and it should be a critical evaluation. It measures the effectiveness of previous elements (methodology context, methodology user, methodology itself). Furthermore, it provides the degree of success that has been achieved. Basically, the evaluation should be carried out at three phases (before, during, after) see figure2, which illustrates how this could be imagined.





**Figur2**

### **3. Methodologies**

#### **3.1 ETHICS**

It is an abbreviation of (Effective technical and human implementation of computer-based systems). It is created by Mumford at Manchester University. Despite the fact that the name of this methodology is meant this approach which is the implementation of it can be done on or embodies an ethical position, this is stated by Enid Mumford (1995). In addition, it comprises the 'socio-technical' view that could mean this methodology could be quite fit with many factors such as social, managerial and organisational that can make the system be done in more effectiveness Enid Mumford (1995).

With regard to the philosophy of ETHICS, it can be seen that the ETHICS is different from the other information systems methodologies, as well as, it can not be considered as a common among these methodologies. Because some methodologies can be implied in some problem or situations of concerns while they can not be done in others.

The socio-technical approach has been defined by Mumford (1983).

*“One which recognises the interaction of technology and people and produces work systems which are both technically efficient and have social characteristics which lead to high job satisfaction.”*

She also defined the job satisfaction.

*“the attainment of a good 'fit' between what the employee is seeking from his work i.e. his job needs, expectations and aspirations, and what he is required to do in his job - the organisational job requirements which mould his experience.”*

However, based on many views many theories for measuring job satisfaction can show how good this fit is.

- 1- The knowledge fit.
- 2- The psychological fit
- 3- The efficiency fit
- 4- The task structure fit
- 5- The ethical fit

One more philosophical of the ETHICS is participation. It is important in decision-making process, and is quite broad to achieve direct and indirect users, such as Moreover, the managers, employees, suppliers and even customers. participation will be best with two tier structure of steering committee and design group. The steering committee sets the guide- lines for the design group, whereas, the design group will design the new system.



- 1- Includes choice of hardware and software.
- 2- Man-machine interaction.
- 3- Re-organization of the design area
- 4- Allocation of responsibilities and tasks to groups and individuals.

### 3.1.1 The stages of ETHICS

Avison, et al (2006) stated in his book, according to Mamford (1986) there are fifteen stages of this methodology or approach and there will be a brief glance for each of them.

#### 1- Why change?

Before starting on the route to designing a new system the Design Group needs to be absolutely clear why it wants to change the existing system. As well as, they should provide convincing statement for changing and if this statement is not convincing then the process will stop when the process arrived.

#### 2- System boundaries

The Design Group must be absolutely clear where its design responsibilities begin and end. Moreover, until they able to do that in-order there are some areas they should consider them:

- a- Business activities affected
  - b- Existing technology affected
  - c- Parts of the organization's environment affected
- #### 3- Description of existing system

This stage enables the Design Group to understand how the current system works.

#### 4, 5, 6- Definition of key objectives and Tasks

In these three stages there are three questions should be asked to assistant define key objectives. The first question is 'what their role is, and what their purpose?' the second one is 'what should be their responsibility and functions?' the last question 'how far do their presents activities match what they should be doing?'. As a result, the key objectives can be extracted from these questions with the new system as well as the key tasks has to be done till to attain these keys objectives to meet their needs from the information.

#### 7- Diagnosis of efficiency

Efficiency needs can be identified by looking for variances. These variances have been identified by Mamford, and basically, they are just two types. First type is systemic and the second type is operational.

#### 8- Diagnosis of job satisfaction needs



The job satisfaction can be measured by this step. However, in doing standard questionnaire and interviews of ETHICS methodology this step can be done by it. Moreover, ETHICS job satisfaction framework covers three broad areas:

*a- Needs associated with personality.*

*B-Needs associated with efficiency in the work role.*

*b- Needs associated with employee values.*

#### 9- Future analysis

Basically, at this stage a new system must be able to adapt to change and must be designed to do so and that will occur when the new system has specific amount of flexibility into.

#### 10- Specifying and weighting efficiency and job satisfaction needs and objectives.

Mumford identifies this stage as key of the whole methodology. And the focus will be on job satisfaction needs and the objectives which have been set on the previous stages.

#### 11- The organisational design of the new system

At this stage the group design have to re-examine its details in stage 5 and try to list some questions for example: 'what are the operating activities that are required?.'

#### 12- Technical option

The concern of this stage is, there must be many technical options and this may include computer hardware, software and the human computer interface. The evaluation of each option will be in the same way.

#### 13- The preparation of a detailed work design

In more details the new system is already designed. Thus, these details should meet the objectives, that to ensure whether the work of design is going in right way or there is something missed or wrong might occurred in previous stages.

#### 14- Implementation

Here is the role of the design group can be shown to ensure that the best designed system is not going to achieve its objectives unless it is successfully implemented and executed.

#### 15- Evaluation

At this stage the new system must be checked and tested in order to see whether the new system met all the objectives otherwise the corrective procedure will take place.

### 3.2 SSADM



SSADM stands for Structured Systems Analysis and Design Methodology, is a methodology was put forth in a UK. It is playing an essential role in UK, specially, in governmental sectors or applications since 1980. Moreover, it was compulsory to use this methodology in Civil Services stratifications. However, there are many factors, reflect the success of SSADM for instance it provides 'project development staff' in details with some regulations, as well as, it has a good structure and it also provide documentations that can cover all aspects of information system development, Avison et al (1997).

### 3.2.1 The stages of SSADM

There are seven stages of SSADM; they are divided into five stages of information system development life cycle, which will be very explicit within the diagram in figure 4.

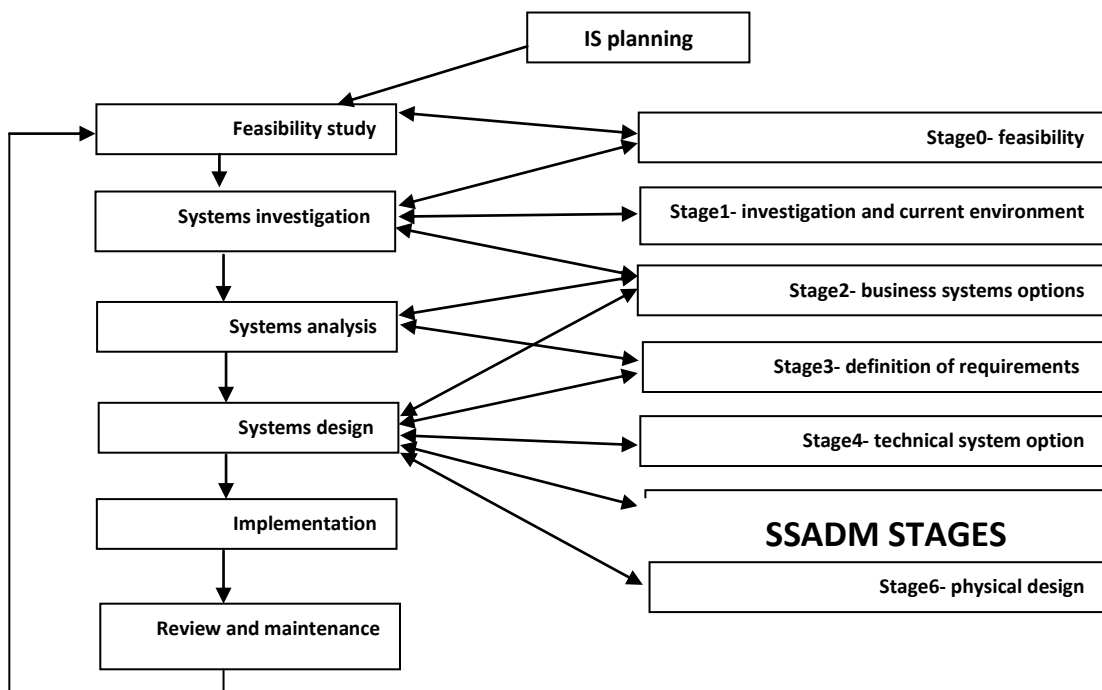


Figure4: The information system life cycle and SSADM - Avison, etl (1997)

#### 0- Feasibility

The ensuring of the project that has been suggested within the planning phase will take a place at feasibility stage. In addition, this stage consists of four steps there can be listed as the following:

- a- Prepare for the feasibility study
- b- Define the problem
- c- Select feasibility option
- d- Create feasibility report



#### 1- Investigation of current environment

At this stage as Avison et al (1997) mentioned ,there is a deep analysis of the current systems and what the requirements are, and the attempt to carry on the other stages based on what this stage has been done and what kind of data and information has been collected in order to finalize the other stage to go through establishing new system. The phase, which this stage has are:

- a- Investigation of current requirement
- b- Investigation of business system

#### 2- Business system option

Within this stage the new function of new system is accepted and determined.

#### 3- Definition of requirements

This stage is considered as the centre of SSADM owing to the full requirements and specifications they will be followed by remaining stages. In more details, there is a swapping in some phases for example the ‘investigation and analysis will be swapped by design and specification ‘Avison et al (2006). At this stage also the objectives of the system are emphasized, and the function of new system must be checked in order to verify the competed definition and support all requirements.

#### 4- Technical systems options

At this stage the logical design will respectively take place. In more details this stage is based on the technical options such hardware and software, which are involved in the implementation. Nevertheless, there could be many alternative sources of these technical options as mentioned. So, perhaps the needs will be in checking the some important factors such as the security and performance and etc that has a great impact on new system.

#### 5- Logical design

The focus on this stage on requirement of the system to do as what it is designed for instead of the procedures and the actions or other any program specifications to do so as well.

#### 6- Physical design

Finally, the physical stage of SSADM, which is the new system, will be adopted with the physical environment. Furthermore, the provision of this stage is the instruction of how the physical implementation will be fit with the exits hardware and software configurations. In order, to reflect the success of the SSADM stages, to establish a new system.

### 3.3 Comparison between ETHICS and SSADM

It worth mentioning that ETHICS methodology is used in varies fields in ethical approaches as ideal solving problems whereas SSADM is a methodology used to

solving problems in field of Information systems [1]. In this comparison, NIMSAD has been applied on both methodologies in order to know which one of them is useful for usage according to the outcome of the comparison. Furthermore, the comparison went through steps of NIMSAD. Even though, we intended to apply NIMSAD that

does not exactly mean the methodology must match each step of the framework or the other frameworks are not valid for such purpose.

NIMSAD's steps	Methodologies	
	ETHICS	SSADM
1- Understanding the situation of concern	●	●
2- Performing the diagnosis	●	●
3- Defining the prognosis outline	○	○
4- Defining the problem	●	○
5- Deriving the notional system	●	●
6- Performing the conceptual design	○	●
7- Performing the physical design	○	●
8- Implementation design	○	○

● Matches ○ Some defeats or weakness' points  
Table: shows the differences and similarities between ETHICS and SSADM.

### Step1- Understanding the situation of concern

In ETHICS, the management is taking a serious part of use this methodology, in order to determine the boundaries of the system between operations' unit and systems' environment. Furthermore, these operations can be investigated by this methodology in order to grasp the knowledge about the problem situation as well as the questionnaire is taken place in this methodology to collect data of job satisfaction. In ETHICS, the process of design is very important due to its effect on participative within the organization (Mumford, 1981).

On the other hand, SSADM concerns the current situation of problem and the steps that are used in this methodology is very explicit to draw a clear picture of the problem by using an interview and questionnaire way with those people who has involved in this problems such as client and so on. Furthermore, SSADM also use a technique of data flow diagrams and try to find out what is the requirement of new system to be established as long as the problem has been defined properly(Avison, et al. 2006).



### **Step2- performing the diagnosis**

At this stage, ETHICS uses many means such recording the videos and writing the descriptions in files which concerned with the recording the data of job satisfaction. Furthermore, it uses a technique to illustrate its activities in two ways vertical physical data flows and horizontal, and this way is not very good. In fact, this may extend depend on the recording of the problems and some suggestions that may merge with it in this stage, as a result, that may lead to interface some desirable features with the current description of the problem (Jayaratna, 1994).

Whereas at this stage. SSADM offers very good contributions here. It uses the data diagrams to describe how the data is going to be (data flow). To perform the diagnosis, SSADM has two ways to do that, firstly, it uses physical data flow in order to describe the processing of data. Secondly, the logical data flow model and mode will be built by use the output of physical data flow, and this would be good idea (Avison, et al . 2006).

### **Step3-Defining the prognosis outline**

In ETHICS, the design group does not have a clear start and finish for its responsibility, that means it is not easy to identify the system and its environment which is under the design stage. Moreover, that surely reflects the weak of this methodology at this stage because the expectations are not formulated in right way in which this methodology does not offer (Jayaratna, 1994).

However, in SSADM, defining the prognosis outline is not easy as well; because SSADM does not provide explicit understanding for the outline of prognosis (Downs Ed et al.1992).

### **Step4- Defining the problem**

In ETHICS, the definition of the problem is taking place in this methodology. In SSADM, the feasibility study is playing good rule to define the problems in right way. Nevertheless, we can not derive the problem due to the prognosis is not too real (Downs Ed et al.1992).

### **Step5-Deriving the notional system**

In ETHICS, some essential questions should be asked by design group, which is related to the design boundary, in order, to be adopted with the process to set the notional system (Jayaratna, 1994). Whereas, the strength of SSADM can be seen from the excellent formulation way in which the requirement of user or client can be attained. Furthermore, SSADM considers its client and attempt to be with them step by step, for any further feedbacks that can improve the process of deriving the notional system and it puts also the assumption of the needs of its user or client (Downs Ed et al.1992).



### **Step6-Performing the conceptual design**

There are many reasons for seeing ETHICS methodology weak; that is very explicit when we find the physical and logical designs are not considered as a separate sets, another reason, ETHICS does not offer the suggestion of its objectives to be realized in the process, even though it use flow charts in its process but that is not very suitable in performing the conceptual and physical design (Jayaratna, 1994).

Conversely, DFD is very useful tool that used in SSADM which can perform the conceptual design. Even though, SSADM has well design physical and logical, but both of them doing different function. However, the system design can be built by the use of SSADM's user requirements after modifying the logical diagram (Downs Ed et al.1992).

### **Step7- Performing the physical design**

This step comes after the design process in ETHICS. ETHICS does not offer the incorporation between the technical option, employer requirements and needs of job satisfaction. Nevertheless, it has good and clear participation but the performance of this step is not too clear (jayaratna, 1994).

In the opposite side, SSADM use the output of the logical design in order to perform the physical design. It also considers all the specifications of the technical which will be used in the environment (Downs Ed et al.1992).

### **Step8- implementation design**

In ETHICS, the objectives are not going to be attained, unless the implementation of designed system successfully completed. This reflects the weakness of ETHICS methodology at this (Jayaratna, 1994).

However, this case in SSADM is the main weakness point for it. Because SSADM ignores this step in its stages (Downs Ed et al.1992).

### **3.4 Evaluation**

In regard to comparison, it has shown variety of different aspects of both methodologies, whether, strength points or weakness of ETHICS and SSADM. For instance, it is obviously to see some weakness points of ETHICS, in step 3 and step 8 in the comparison with some lack in other steps not all, and likewise with SSADM, but that does not scarcely mean these methodologies are not good, since each methodology actually has its characteristics and defects. As can be seen, ETHICS is generally better than SSADM, because we can deeply work within a project through fifteen steps include the implementations step which is not existed in SSADM as well as the evaluation of whole project in last step. Another key point, defining a problem is a very significant step, this could led to shape all problem's sides, and accordingly providing solutions in an efficient manner, ETHICS has this valuable step unlike SSADM.

### **4. Conclusion**

Surely, each methodology has its own techniques, tools and stages including steps. With this intention, some methodologies can be used and applied and further can



match the requirements of intended system or project. In this respect, this helps the users' methodology to pursue their stages on the right path.

According to the comparison, all things are considered to make a clear decision on which methodology is better than the other. Indeed, it is a bit difficult to fully understand both methodologies how they perform. ETHICS and SSADM are equally important and both of them have their advantages and disadvantages. As I have aimed in this paper an implication of ETHICS in some cases, it is might be suitable for use as an ideal selection. In like manner, the selection of SSADM can work perfectly as well. Although this is may be true, but from my point of view, the result of the comparison has explicitly shown that ETHICS is comparatively still a better choice than SSADM after being compared based on the steps of NIMSAD.

Even though, this is still a point of view; some might agree or disagree with me. However, this paper could be considered as a simulating debate rather than a statement of facts about the selected methodologies. Ultimately, the final and the best decision can be token by considering two things; who will use the methodology and what purpose of use is.

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