UNIVERSIDAD TÉCNICA DEL NORTE

FACULTY OF APPLIED SCIENCES ENGINEERING

CAREER OF COMPUTER SYSTEMS ENGENDERING

GRADE WORK PRIOR TO OBTAINING TITLE COMPUTER SYSTEMS ENGINEERING

SCIENTIFIC PAPER (ENGLISH)

SUBJECT:

"DEVELOPMENT OF A DIDACTIC TOOL FOR THE MANAGEMENT OF PROJECTS THROUGH THE LOGICAL FRAMEWORK MATRIX"

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DEVELOPMENT OF A DIDACTIC TOOL FOR THE MANAGEMENT OF PROJECTS THROUGH THE LOGICAL FRAMEWORK MATRIX

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Abstract. *This project is about the development of a software tool for generating projects through the methodology of Logical Framework, making use of new technologies such as: NodeJS, angularjs and MongoDB and deployed in the cloud OpenShift.*

The methodology of the Logical Framework and its steps are explained used to make quality projects.

The software part it is about the new tools and their advantages over the traditional ones resulting in a web system on a platform in the cloud accessible to anyone with Internet access.

Keywords

Logical framework matrix, Software, NodeJS, MongoDB, AngularJS, project management.

Resumen. *El presente proyecto trata sobre el desarrollo de una herramienta informática para la generación y gestión de proyectos mediante la metodología de Matriz de Marco Lógico, haciendo uso de nuevas tecnologías como: NodeJS, AngularJS y MongoDB y desplegada en la nube de Openshift.*

Se explica la metodología que usa la matriz de marco lógico así como los pasos que usa para generar proyectos de calidad.

Dentro del software se explica las nuevas herramientas y sus ventajas sobre las tradicionales dando por resultado un sistema web sobre una plataforma en la nube accesible para cualquier persona con acceso a internet.

Palabras Claves

Matriz de marco lógico, Software, NodeJS, MongoDB, AngularJS, Gestión de proyectos.

1. Introduction

The quality projects are those that consist of well-defined parts and consistent among themselves, i.e. that make sense with each other. Many of the projects are prepared in an empirical manner without taking into account the relationship of their components, it is each step as a separate content without having in mind that they are a all that is related to each other.

Project management is a field that with time has been gaining strength within the globalized environment, lately within the medium, have arisen several methodologies for the implementation and management of the projects, but the same need a deep knowledge and advanced on the same for its use. This being the case tools they need some expertise to its maximum exploitation.

In the middle there are tools that help in the management of the projects, but these require likewise knowledge of the methodology, which hinders their use and understanding without being didactic with the user, and leaving it without a support for the management of its projects, other tools in change does not present all the functionalities of the methodologies and tools of generation of schedule of activities, filling and only certain parts of a complete project and of quality. Leaving certain components of a project outside the context which does not allow the complete generation, efficient and effective implementation of a project of quality that fully meets the standards of a methodology.

The main problem is the relationship of contents of the projects and impossible to perform an appropriate follow-up, this is due to the lack of educational tools that use methodologies for the management of quality projects thus leaving students, teachers, clubs with the difficult task of learning independently different methodologies and creating an environment which is not unified for the follow-up of the same people themselves in the development of projects. Leading to an environment which is not inclusive; where

each entity generates its own methodology, creating forms of management is not standardized.

This generates a development of projects by the university community precarious, without ways to manage the same putting a lockout from the start of the mimes which generate problems in the future if the project continues.

The logical framework matrix is a simple and effective methodology that will allow using a procedure to define the fundamental pieces of a project through graphic organizers and techniques. This methodology also generates projects with content consistent and interrelated in a quick and simple way using a matrix in which we can appreciate all the project so fast and concrete.

A dynamic tool and didactics that facilitates the management of projects using the logical framework methodology has been a missing element within our academic system, taking into account existing tools do not comply with all the steps of a methodology, automating certain steps and omitting others. This generates gaps within the project confusing to the user and misinterpreting the use of these tools.

A project management tool using logical framework will allow students to learn a way of generating projects with the fundamental parts of the same, and teachers to carry out a follow-up of projects for easy way.

The main purpose of the tool is to help both teachers and students within the production projects easily, quickly and performing certain quality standards for the management and monitoring of projects through the logical framework methodology.

2. Materials and Methods

2.1 Logical framework matrix

This methodology for project management was born due to the lack of correlation between objectives and activities within the projects, this methodology provides a sequence of steps for the correct identification of the main problem determined through a sequence of steps and giving us certain guidelines to achieve this in the correct manner, we can also provides easy-to-use methods in order to determine the objectives and their corresponding activities.

The main product of this methodology is the logical framework matrix that is a graphic organizer in which will contain the essential elements of a draft correlacionándolos so simple and summary. This graphic organizer is the final product after a process that the methodology provides, and mainly consists of the following aspects shown in the following figure:
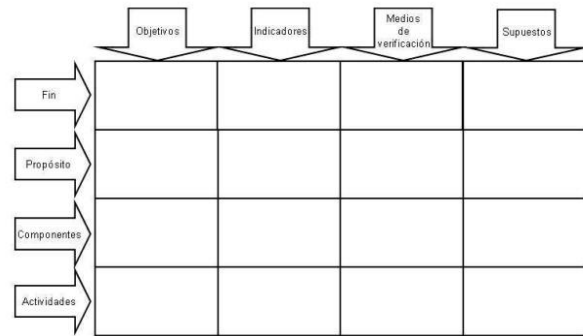

Figure. 1.   Format of the logical framework matrix

2.1.1   Methodology

This is known as the methodology of logical framework due to their way of being, i.e. this consists of a sequence of steps in which each requires the previous one to be able to continue, and in each step gives us a method to meet the objectives of the same.

The steps of this methodology consists of the following structure shown in the following image:
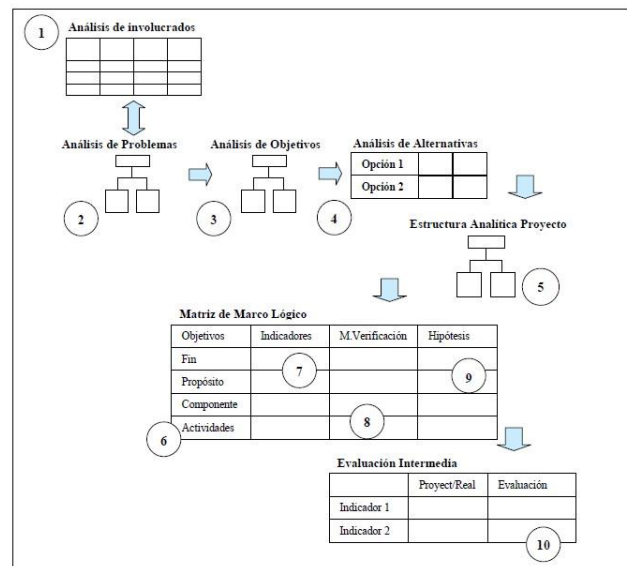

Figure. 2. Format of the logical framework matrix

2.2   Methodology of Extreme Programming

The development methodology XP, is a metodóloga rapid development, rapid development methodologies to difference that their peers, traditional methodologies, focus on the development of the system and the relationships with the client but not in the documentation for each stage. Use a flexible philosophy that you can change on the development

process that allows more rapid and less strict to generate computer systems in small groups.[1]

The Extreme Programming comes as a new current and alternative to traditional methodologies, providing an environment that is focused on the development by eliminating unnecessary steps that you create.

The main creator and author of this methodology Kent Beck proposes this methodology as a quick way and without jacks for developers creating shorter and faster cycles of development known as iterations and accepting that in each cycle there may be changes in the requirements.

2.3 NodeJS

Figure. 3.   NodeJS logo

This platform was designed by Ryan Lienhart Dahl, launched on 27 May 2009. Its stable version to date is **Node.js 0.10.33**   launched on 20 October 2014. Developed on the javascript V8 engine in the   languages of C++ which ensures its efficiency, it is multiplatform and licensed under MIT.[2]

Node.js is the execution engine of javascript, V8 of Google Chrome, modified to an environment outside of the browser offering us the possibility of using this language outside the programming environment of scripting[3] within the web pages, based on an event-driven architecture is a new programming paradigm that tries to generate real-time applications with emphasis on events and controlling through **callbacks**[4] that he is sent of functions as parameters of another function. This thanks to one of the most important features of javascript that is your model of **non-blocking code**.

Node.js is a platform that provides developers with a new form of systems development and has thousands of packages[5] to increase the speed of development on this platform. Developed by the Community for the same and are free of charge.

2.4 MongoDB

Figure. 4.   MongoDB logo

Talk of MongoDB is to speak of a new stream that takes force within the world of databases, where the relational databases have had a long and prosperous monarchy, where they have been the kings of the data for a long time but from below the new flows are bringing new technologies and expect to overthrow this large.

These new technologies could say that are relatively new for the growth that have been taking in recent times but is already for a long time ago, but with the new paradigms that are now is that they have had a big push.

Mongo DB is a documentary database that your model of store data is based on each object within the programming language is a document and is stored with a unique ID within a collection of documents, these documents are data structures as simple as a single data up to complex structures with nested data. These databases have taken in recent times a great reception due to its versatility and simplicity of data model.   The   largest   within   the   market are **mongoDB** and **couchDB**.

2.5 AngularJS

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[1] Extreme Programming (Extreme programming): Agile development methodology.

[2] The MIT License is one of a number of software licenses that has used the Massachusetts Institute of Technology   (MIT,   the   Massachusetts Institute of Technology).

[3] Scripting are small pieces of code that perform basic functions within a site.

[4] In the programming, is a function that runs in response to a particular event.

[5]   Packages   are components of midleware to facilitate the development of applications.

AngularJS by its purpose technically is a framework that helps us to a large extent to the development of web applications. This "**superheroic"** framework gives us the opportunity to move certain tasks of the served the user by reducing the load on the server and the user repartiéndola, this at the same time which is a advantage may be their worst quality because it depends on the processing capability of the computer of the user.

This technology developed by one of the giants of the Google computing and the community to be an open source project allows us to have access to its code. Under the license of **MIT**. This library written in Javascript implements a schedule on the side of the customer by creating a new paradigm of web programming.

2.6 Services Representational State Transfer (REST)

Is a web architecture used within distributed systems that enables the exchange of resources through representations of the same and exchanging their states through the **HTTP methods** such as **GET**, **POTS**, **OPTIONS**, etc.

To be able to identify the **REST resources** makes use of URI[6] that are the identifiers that allow you to locate a resource using the address of the same for example Www.organizacion.com/recurso

Unlike other distributed architectures this puts emphasis on the definition of the resources most not methods of each resource, this is due to the use of **HTTP** uses the methods of this to define the operations of the resources it provides.

In conclusion the **RESTful services** are the implementation of **rest** within our applications to be able to build a service-oriented architecture.

With the new paradigms of programming and the variety of devices programming has taken a path-oriented services in order to evade the visual part or in that work the application device this due to as mentioned above the great variety of devices that exist in the market.

Thanks to new architectures as **MVC** that allow us to separate the logic of the visual we have an alternative for designing applications but to apply these architectural designs is complex within web applications. The service-oriented programming comes as an alternative in which

develops all as services and the clients are those who are responsible for decorating the results of the services.

The web services (Web Services) based on **SOAP**[7] are an alternative to schedule service-oriented and allows you to have different customers regardless of language or device they use thanks to this the maintainability and scalability of the applications improves. But these have a great disadvantage and is the large amount of middleware that need and the complexity of its development, but on the other hand arervicios with a great safety.

On the other hand and as an alternative to the **SOAP-based web services** comes a new flow of **REST-based web services** that are the **RESTful** web services. These give us a more simple and easy to deploy services without both **middleware** and making use of the methods of the **HTTP protocol**.

3. Results

As a final result is obtained a software on the web which can be accessed from any computer with internet, by accessing the following web address into the browser:

http://mml-mfbg.rhcloud.com/

3.1 Software

Below are some screenshots of the system for the management of projects through the hue of logical framework.

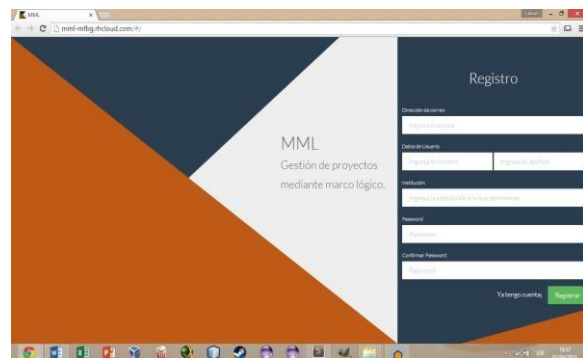**Figure. 6.**   Main interface of the tool for project management

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[6] Universal Resource Locator

[7] Simple access protocol objects

Figure. 7. Management interface of the projects of the user

Figure. 8. Management interface of a project

Figure. 9. Logical framework matrix

Figure. 10. Tracking Management Interface

Figure. 11. User Help box

3.2 Impact Analysis

3.2.1 Social

In the social sphere the development of web applications in general contribute to society; through globalization and distribution of knowledge to improve their quality of life. The management of projects is a social act in which one or more people generate solutions for society, automating and making use of the new technologies, this in turn allows for a more active involvement of the individuals involved in the social development.

In the following table is an analysis of the impact of this project on society:

Indicadores \ Nivel de impacto	3	2	1	0	-1	-2	-3	TOTAL
Inclusión social		X						2
Condiciones de vida		X						2
Contribución social			X					1
TOTAL								5

Table. 1. Table of Social Indicators

To perform the calculation uses the following formula, which determines the index that corresponds to each impact.

Impact level = (∑ impacts)/(number

    Impacts)

Social impact = 5/3

Social impact = 1.66… ≈ 2

- **Social inclusion**

The system of project management through logical framework matrix to be on the cloud and be accessible via the internet allows people to have more facilities for collaboration by helping you can work more quickly from sites more comfortable, providing a factor of social inclusion that many times is diminished by the difficulty of locating or mobility of the people.

- **Living conditions**

The system of project management through logical framework matrix is a didactic tool that account with the necessary assistance to enable users to generate projects more easily and effectively, in addition to make use of the logical framework methodology that provides facilities and a clear and simple process for project management; improving the quality of life and work in computer using distributed systems, in addition allows people to make better use of their time and to produce projects easily and with international standards.

- **Social Contribution**

To make use of a standard of the Economic Commission for Latin America and the Caribbean; contributes to the production of quality projects that generate the people, contributing to society of quality projects and a prior analysis using the logical framework matrix, which allows you to create solutions to current problems of society through a sequential process and easy to understand.

3.2.2 Economic

Within the economy projects are the basis of economic growth and development, using this tool that helps the generation and follow-up of the same; greatly improves the economic field of a social group. The use of this tool, accessible and easy to use to minimize the time and improve the quality of the generation and monitoring of projects.

In the following table is an analysis of the economic impact:

Nivel de impacto Indicadores	3	2	1	0	-1	-2	-3	TOTAL
Reducción de gastos		X						2
Ahorro de tiempo	X							3
Productividad			X					1
TOTAL								6

Table. 2. Table of economic indicators

To perform the calculation uses the following formula, which determines the index that corresponds to each impact.

Impact level = (∑ impacts)/(number

Impacts)

Economic impact = 6/3

Economic impact = 2

- **Cost Reduction**

The expenditure involved in the elaboration of projects is not a determining factor but if you can see affected the quality of the same due to the use of paper that is not a means one hundred percent reliable to store information, in addition to the costs involved by the mobilization of each member of a group, thanks to this tool is intended to reduce the costs of those mentioned above as is the consumption of office supplies, in addition to being on a cloud on the internet allows you to work without the need to hold meetings with the working group in the event that the project is required so.

- **Time saving**

Any software tool has as its principle to reduce the time of a business process, in the case of the tool for project management through the logical framework matrix is no exception, through the systematization and use of the logical framework that is a methodology for project management of quality reduces the process of creating a project generating adequate documentation of the same so simple and didactics in less time and collaborating to several people at the same time.

- **Productivity**

Through quality projects, structured and well formulated the productivity is guaranteed, in addition to making a good follow-up taking into account indicators for the evaluation of objectives, this is what the tool offers; improve the projects that are generated, also provide centrally the box, forward and check its development in real time.

3.2.3 Environmental

In the present environment is a factor almost in any project that determinant develops since it can be a factor of final acceptance for the project to be fully implemented.

The software in relation to the environment presents points to favor as is the reduction of the use of materials and against due to the generation of energy costs and hardware.

In the following table is an analysis of the impact of this project on the environment:

Nivel de impacto / Indicadores	3	2	1	0	-1	-2	-3	TOTAL
Contaminación				X				0
Huella ecológica		X						2
Deforestación		X						2
TOTAL								4

Table. 3. Table of environmental indicators

To perform the calculation uses the following formula, which determines the index that corresponds to each impact.

Impact level = ($\sum$ impacts)/(number

Impacts)

Social impact = 4/3

Social impact = $1.33\ldots \approx 1$

- **Contamination**

The software generates technological pollution, in addition to the use of energy that comes from non-renewable sources that pollute the environment.

The system of project management through the logical framework matrix is designed with an architecture PASS, i.e. it is a unique service and that this on a cloud, requires no installation disks, also reduces the use of hardware using virtualized servers that are provided by the service of PASS OPENSHIFT.

To be on a pass if there is energy expenditure which is a pollutant, but to be a company at the international level the supplier of the PASS AS IS OPENSHIFT guarantees the use minimum energy and always tending to renewable energy sources.

- **Ecological Footprint**

Aid for the reduction of inputs of office, making use of architectures pass that reduce the use of hardware that the tool generates. It is through this small contribution to the environment that demonstrates that you can generate software projects more friendly with the environment without making use of excessive hardware.

- **Deforestation**

By reducing the consumption of paper in all steps of generation and monitoring of a project is greatly reduced deforestation, since the project and all its steps for its preparation, review and monitoring are stored digitally.

4. Conclusions

- The management of projects is a science that contains no end of methodologies and form to generate quality projects, the logical framework matrix although Antigua has already demonstrated that it is one of the most efficient and easy to use through its graphic organizers their methodologies provides us with an easy and simple way of generating quality projects.
- The logical framework matrix is also a good way of monitoring and verifying the implementation of the phases of a project using their indicators provide a useful and effective way to review the progress of a project and keep abreast of its development.
- Thanks to the teaching methods as the Tree of problems and objectives tree ensures a correct identification of components of a project as well as a correct relationship between the components of a project.
- There are currently a large number of new technologies in the market that allow us to realization of large applications more quickly and efficiently.
- Thanks to the growth of the internet and its technology is now very easy to have mounted applications over the network without complication, this thanks to the **PAAS** we offer a simple way of having a space of development for our applications without having to worry about unnecessary configurations, sometimes long and tedious that we waste time and complicate the deployment of applications.
- The **PAAS** are a great way to deploy applications on the internet for developers who do not have the resources necessary to take their own structures of deployment as data centers.
- Within the new storage systems there are several options, **MongoBD** is a giant currently in which to storage **no SQL** refers, provides great speed in consultations and presents a data model based on simple BJSON that can be changed easily and modeling with the changes that are present.
- **MongoDB** does not define specific data schemes or fixed these can drastically change from each other to improve its scalability.
- JavaScript Ancio as a language of scripting, its use is based purely on improving web pages, but thanks to its versatility and programming paradigm is a language

that currently serves to schedule things beyond that simple improvements to web pages.

- Thanks to **javascript NodeJS** provides the functionality is a programming language giving opportunities to do great things with this, still young, programming language.
- The handling of concurrency in **javascript** with **NodeJS** is cleaner and more easy due to its programming paradigm oriented to events, a bit complex to understand this new format of programming but at the same time presents qualities that we are useful in the development of real-time applications.
- Requires a certain level of understanding in the handling of concurrency pass of a language of lock to one not to lock as what is **Javascript**.
- **NodeJS** presents large amount of modules or components developed by the community and under free licenses to facilitate the development of applications and improve the scope and the extensibility of the programming language.
- **AngularJS** a set of **javascript libraries** that allow you to spend a large amount of work from the server to the client side, gives us a clear and efficient way to improve the speed of our applications by subtracting certain tasks from the server and put them to the side of the customer.
- **AngularJS** lets you organize in a better way the client-side code this thanks to your model Model View Controller (MVC) on the client side.
- Thanks to the libraries of **AngularJS** the development of the views are made more quickly and effectively.
- **NodeJS** within the web application development presents us with great benefits such as what is the portability that it does not require an application server this is already embedded inside the engine of **NodeJS,** unlike other languages that require an application server to which the different applications can be deployed.
- The package or set of technologies **mean** (MongoBD Express AngularJS NodeJS) in a clear and effective tool for the development of real-time applications that by their nature and strict use of **Javascript** and **JSON** as the main language make this set this well integrated and provide a simple and best way to build web applications.
- REST services are a fast and simple, but less secure to generate service oriented architectures.
- The Methodologies XP is a quick way to generate documentation and easy for the developer without excess of repetitive and tedious processes on the documentation.
- The XP methodology is an excellent methodology for small and medium-sized computer systems.

Acknowledgments

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