

Chapter 12

Develop a Virtual Learning Environment (Eva) to Train Agents in Security and Private Surveillance



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Abstract Constitutes the planning of a software development project characterized mainly by the detailed identification of requirements, description of the activities of the process, distribution of efforts and tasks, scheduling of tasks, budget and analysis of risks. The project aims to cover the existing demand in Ecuador for Security Agents, the same ones that cannot currently be covered in the existing Training and Improvement Schools. The EVA Virtual Learning Environment is based on existing Learning Management Systems (LMS) that exploit web 2.0 tools, but with additional innovative and disruptive features such as biometric security and the use of 3D virtual reality environments for teaching and learning. e-learning learning. For total control of the EVA project from the Project Management, the PMBOK Guide was used; In terms of software development planning, Scrum, an agile framework, was used.

12.1 Introduction

The current world presents social, political, economic and cultural conditions that have allowed the development of the digital society, characterized by the use of Information and Communication Technologies (ICTs), the dominant form of communication, sharing of information and knowledge.

In the educational field worldwide, as well as in Ecuador, ICTs have produced great changes in the dynamics of traditional teaching and learning processes, through the design, creation and use of educational platforms, they have allowed the student to disappear the barriers of space and time. These educational platforms are based on the use of the Internet and involve the exchange of information between the Instructor and the students, in an asynchronous manner, where the student does not coincide in time or virtual space with the Instructor for the development of their activities,

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or synchronously, where students attend classes live and match their classmates and the Instructor.

In the professional field, especially private security in Ecuador, there is still resistance to the use of technology and e-learning teaching and learning, maintaining face-to-face training in the Security training and improvement schools. However, the new vision of the National Association of Comprehensive Security and Investigation Companies ANESI seeks to streamline the process of registering, training and updating private security agents through the use of web software such as EVA virtual learning environments. This “Plan to develop a Virtual Learning Environment (EVA) to train agents in Security and Private Surveillance” is a proposal that aims to take advantage of Tics and web 2.0 tools to implement virtual teaching and learning processes, the same ones that have never been implemented in this professional branch.

12.2 Methodology

The planning of the EVA project implemented the PMBOK Project Management Fundamentals Guide, which would allow, among its activities, mainly to identify requirements, establish communications between stakeholders, manage the scope, quality and risks of the project, as well as establish a schedule of work, budget and resources.

For the planning of the product development, the agile Scrum framework will be used, which will allow responding to unforeseen changes beforehand and being able to make much faster deliveries.

12.2.1 PMBOK

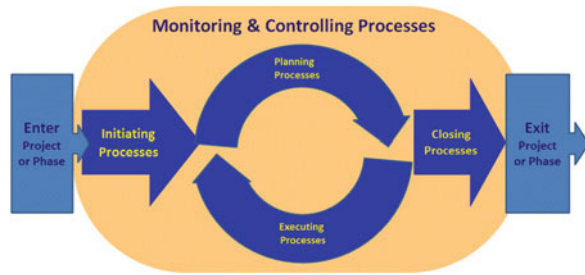
The Guide to the Fundamentals of Project Management PMBOK (“Project Management Body of Knowledge”) [1], includes a set of good practices and standards for project planning.

With PMBOK, the entire life cycle of the project is managed with the achievement of process activities corresponding to Project Management, whose results define the end of one process and the start of another. As can be seen in Fig. 12.1, PMBOK concentrates the Project Management processes in 5 groups:

12.2.1.1 Start Process Group

They are a set of processes that officiate the beginning of the project, stating in a Project Constitution Act, relevant information such as the purpose and scope of the

Fig. 12.1 PMBOK project management process groups



project; Identification of the Interested Parties; assumptions and restrictions; financial resources to commit and designation of the Project Director.

The information that appears in the start-up processes is of the utmost importance since any activity or decision that you want to take revolves around the business need that was established in the articles of incorporation.

12.2.1.2 Planning Process Group

It comprises a large set of processes that will define the scope of the project and detailed actions to be taken to achieve the objectives in terms of time, cost and quality.

The activities of the Project Management processes are:

- Project Scope Management: Plan Scope Management, Gather Requirements, Define Scope, Create WBS/WBS Work Breakdown Structure.
- Management of the project schedule: plan the management of the schedule, define activities, sequence the activities, estimate the duration of the activities and develop the schedule.
- Project cost management: plan cost management, estimate costs, determine budget.
- Project quality management: plan quality management.
- Project resource management: plan resource management, estimate activity resources.
- Project communications management, plan communications management.
- Project risk management: plan risk management, identify risks, perform quantitative risk analysis, plan risk response and perform qualitative risk analysis.
- Management of the Stakeholders of the project: plan the management of the interested parties.
- Project procurement management: Plan project procurement management.

12.2.1.3 Execution Process Group

For this group of processes, the Scrum agile framework will be implemented in order to obtain a product based on defined iterations with specific objectives and tasks.

12.2.1.4 Group of Monitoring and Control Processes

They are a set of processes dedicated exclusively to Monitoring project performance, taking action, reporting and disseminating; Control refers to comparing actual and planned performance, evaluating alternatives and recommending corrective actions.

The activities of the Monitoring and Control processes are:

- Project scope management: validate and control the scope.
- Project schedule management: controls the schedule.
- Project risk management: monitor risks.

12.2.1.5 Closing Process Group

They are processes that determine the formal closure of the project based on a verification of each process of each group.

12.2.2 Scrum

The Scrum Guide clearly and simply defines Scrum as a process framework that has been used to manage the development of complex products since the early 1990s, within which various processes and techniques can be used [1, 2]. Scrum is based on the Scrum Team and its roles, artifacts and events. We can see in Table 12.1 the roles, artifacts and events:

Table 12.1 Scrum framework

Scrum team	Artifact	Event
Product Owner	*Product Backlog	* Sprint Planning
Scrum Master Development Team	*Sprint Backlog	* Daily Scrum * Sprint review * Sprint retrospective

Table 12.2 Artifacts of Scrum

Artifact	Event
Product Backlog	It is the ordered and prioritized list of product requirements, it contains characteristics, functionalities, product requirements to be carried out. Some attributes of the Product Backlog are: description, order, estimate and value The Product Owner is responsible for managing the Product Backlog
Sprint Backlog	It is the list of elements of the Product Backlog selected for the Sprints, plus those product increments made by the Development Team

12.2.2.1 Scrum Team

The Scrum Team is made up of:

- The Product Owner is in charge of optimizing and maximizing the value of the product and the work of the Development Team. The Product Owner's decisions are respected and should be reflected in the content and prioritization of the Product Backlog.
- The Scrum Master has the main function that the entire Scrum Team understands and adopts the Scrum; its theory and rules. Maximizes the value created by the Product Owner and the Development Team.
- The Development Team or development team is a group of highly technical professionals responsible for creating a high-quality product.

12.2.2.2 Artifacts

They reference key information that maximizes work, provides transparency and opportunities for product development. A description of the artifacts is shown in Table 12.2.

12.2.2.3 Events

Events are blocks of time (time box) that allow the Scrum Team to hold work meetings. The Sprint represents a container of events and each event constitutes a temporary block (iteration), the result of the Sprint is an increment of finished product. Table 12.3 shows a description of the events:

12.2.2.4 Scrum Cycle

The Product Owner, Scrum Master and the Development Team are involved in the process. The characteristics of a product are reflected in the Product Backlog, whose order of priority is determined by the Product Owner, the Scrum cycle can be seen in Fig. 12.2

Table 12.3 Events in Scrum

Artifact	Event
Sprint planning	<p>It is a meeting that allows planning the tasks that will be carried out in an iteration divided into 2 parts</p> <p>1st part of the meeting with a maximum Timebox of 4 h</p> <ul style="list-style-type: none"> • The Product Owner presents the prioritized Product Backlog • Name the goal of the iteration • Proposes the highest priority requirements to be developed in the iteration • The Scrum Team verifies the Product Backlog • Questions are asked to the Product Owner about concerns • The Scrum Team adds: satisfaction conditions and selects the highest priority objectives/requirements <p>2nd part of the meeting with a maximum Timebox of 4 h</p> <ul style="list-style-type: none"> • The Scrum Team plans the iterations, prioritizing themselves to obtain the best possible result and with minimal effort • The Scrum Team defines the tasks that complete each requirement, the estimation of each task is made • The members of the Development Team assign themselves tasks according to their specialty
Daily scrum	<p>They are Scrum Team meetings with a 15-min Timebox, whose purpose is to combine activities, transfer information and establish commitments to fulfill in a work plan for the next Daily Scrum</p> <p>The inevitable questions in this type of meeting are: What was done yesterday? What was done today? What will you do tomorrow? and what problems did you find?</p>
Sprint review	<p>They are informal meetings between the Scrum Team, Product Owner and Stakeholders with a Timebox of 4 h for Sprints of 1 month and shorter Timebox depending on shorter Sprints</p> <p>The meeting is for feedback on the Sprints and the Product Backlog</p>
Sprint retrospective	<p>They are formal meetings between the Scrum Master and the Development Team with a Timebox of 3 h for Sprints of 1 month and shorter Timebox depending on shorter Sprints</p> <p>The retrospective Sprint continually seeks to improve the performance and quality of the product, and improvements are defined for the next Sprint</p>

The Product Owner subsequently transmits the Product Backlog to the Scrum Master and the Development Team in a Sprint Planning, where it is planned how to provide a solution to the product in the first phase, the result of which is the obtaining of a list of functionalities, Sprint Backlog; the product development process called Sprint continues in which the Scrum Master and the Development Team participate; During the Sprint, other events take place, such as the Daily Scrum, daily 15-min follow-up meetings. At the end of the Sprint, another event called Sprint Review occurs, which creates a moment for the Scrum Team to verify compliance with the goals and assigned development times; it ends with a last event called Sprint Retrospective that looks for improvements that can be applied to the next Sprint, the fulfillment of all the Sprints forms the final functional product.

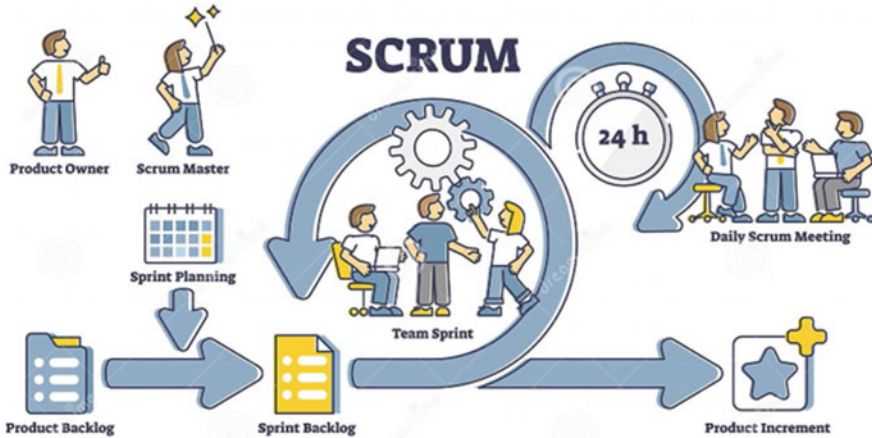


Fig. 12.2 Scrum cycle

12.3 Results

12.3.1 Start Phase

The National Association of Comprehensive Security and Investigation Companies—ANESI authorizes a project according to a business need and appoints Mr. Robert Cedeño as Project Director, who must comply with different processes that define the beginning of the project:

12.3.1.1 Project Constitution Act

The beginning of the project is endorsed or made official by the organization, the ANESI in a Project Constitution Act that generally contemplates:

- Description of the product to be obtained, purpose and scope of the project.
- Business need and cost–benefit analysis
- Internal agreements to ensure proper delivery of the project.

12.3.1.2 Purpose of the Project

The purpose of the project is to plan the development of a web platform that works in the cloud, provided with a set of computer tools that are easy to access and use for teaching e-learning to agents in Security and Private Surveillance.

The project must contemplate different pedagogical and technological components of an LMS learning management system, but with innovative implementations of biometric security and exploitation of 3D environments.

The implementation of the project in the cloud would imply the elimination of unnecessary geographical displacements on the part of the users, saving time and reducing travel and travel expenses; likewise, access to training in private security would increase.

12.3.1.3 Description of Roles and Responsibilities

The organizational structure for the project is shown in Fig. 12.3:

- **Project manager:** is the guide person, responsible for managing and evaluating the development of the project, achievements and compliance with the schedule; plans and monitors the project; manages the internal communication of the work team. Promote practices that reflect teamwork.
- **Project Coordinator:** is responsible for ensuring the scope and success of the project. Its functions are to coordinate all project activities, manage budget, ensure risks and quality of the project. Maintains communication with Stakeholders and Work Package Leaders.
- **Stakeholders:** The stakeholders of the project maintain communication with the Project Coordinator and the leaders of the WP work packages; The greatest contribution to the project is the promotion of participation, involvement and acceptance of work approaches with the purpose of achieving the success of the project.
- **WP Work Package Leader:** is the person responsible for the administration of each work package and all its tasks. Its functions are to organize and manage the tasks of the work package, coordinate delivery of work packages, ensure compliance with objectives and results of the work package. Delivery to the Project Coordinator information regarding the work package.
- **Task Leader:** is the person responsible for managing a task belonging to a WP work package. Its main functions are to coordinate delivery of tasks, maintain

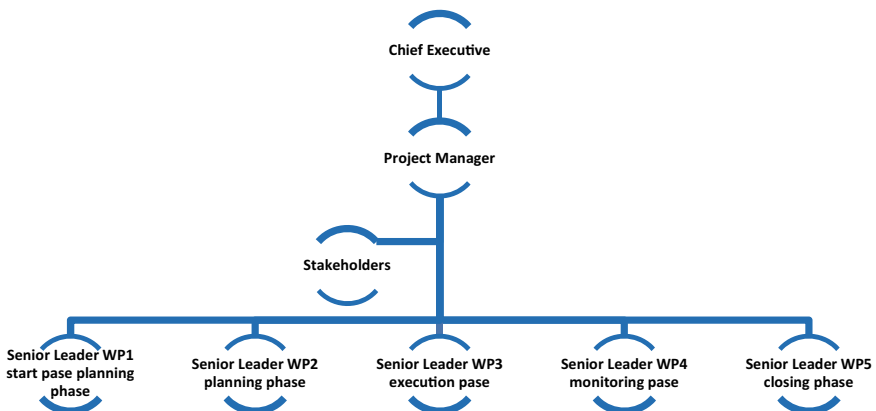


Fig. 12.3 Organizational structure of the project

communication with the WP Work Package Leaders by delivering information related to the task.

12.3.1.4 Assumptions and Restrictions

- The project aims to boost the education and training of security agents virtually, to provide a greater number of professionals in security and citizen surveillance available to private companies and civil society.
- The project implements new implementations to the existing LMS with the purpose of complying with the requirements of the Ministry of Government to the Training Centers of security and surveillance agents.
- There is a commitment by the Stakeholders to participate in the project in accordance with the provisions of the Work Plan.
- The start and end time of the project should not exceed 12 months.
- The project must consider functional and non-functional requirements.

12.3.1.5 Interested Parties

The Stakeholders or stakeholders of the project are the organizations with which ANESI has some type of interrelation, these organizations can be influenced by the implementation of the project, as shown in Fig. 12.4.

The level of interest in the project is analyzed once the stakeholders have been identified, for which it can be determined by using a Relevance Matrix [1, 3], see Fig. 12.5: Relevance Matrix.

Stakeholders with interest and influence in the project can also be identified according to the Influence-Impact Matrix, see Fig. 12.6.

12.3.2 Planning Phase

12.3.2.1 Scope Management Plan

Requirements Management

Through the active participation of the Stakeholders, it is possible to determine the needs in product requirements, the documentation of these conditions or characteristics of the product are known in the agile Scrum framework as User Stories. Based on the PMBOK Guide, Table 12.4 was built: Project Requirements, which includes the different functional and non-functional requirements of the project:

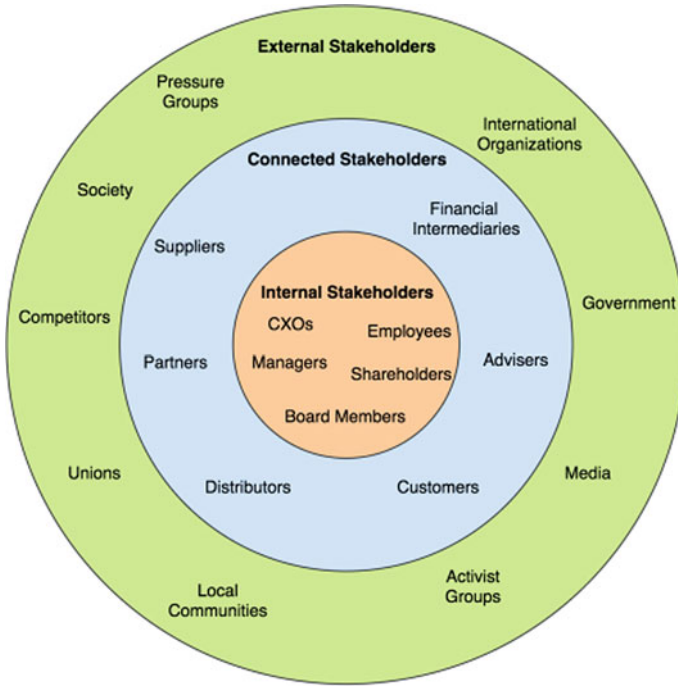
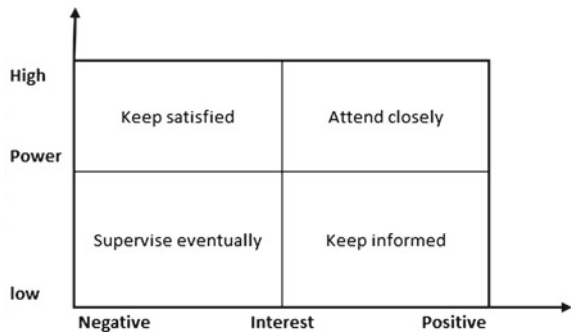


Fig. 12.4 The stakeholders

Fig. 12.5 Relevance matrix

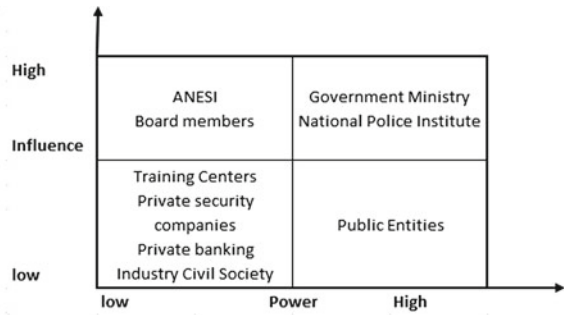


Strategic Objectives of the Organization

Provide quality service: customers must receive a quality service through specialized and trained security and surveillance personnel, with a great sense of belonging.

Meet customer expectations: the organizational structure of ANESI [1] and the security companies with their personnel must demonstrate with actions the services they offer to customers to generate trust and fulfillment of expectations

Fig. 12.6 Influence-impact matrix



for the service. Compliance with requirements: security companies must comply with current regulations in the preparation of their security personnel.

Maintain necessary infrastructure: ANESI must plan and invest in updating its technological infrastructure at the service of security companies.

Purpose of the Project

Systematization of services: the project will implement e-learning services available to users, replacing the face-to-face study paradigm currently in use.

Continuous service: the use of cloud services reduces ongoing costs of physical infrastructure, software update and guaranteed security for the operation of the web platform.

Additionally, it guarantees access to the system from any physical location and its continuous operation.

Implementation of services: e-learning services in this area of security and private surveillance are outstanding in the country.

Product Description

The EVA Virtual Learning Environment is designed to educate and train agents in Security and Private Surveillance. It is based on existing Learning Management Systems (LMS), but has additional features such as biometric security and the use of 3D virtual reality environments for teaching and e-learning.

The project is a web-type software that works with services in the cloud, taking advantage of the accessibility that it would allow from any geographical location, accessibility from any computing device, service availability 24 h a day, 365 days a year, availability of software updates, Hardware and Software scalability, data security.

For the design and subsequent development of the project, the use of free software has been planned to reduce costs.

Table 12.4 Project requirements

Functional requirement	Non-functional requirement
RF001-Authentication: user access to the study platform is through a username and password, through user biometrics	RNF001-Accessibility from any location: must have Cloud Computing services
RF002-User profile: information management of each user	RNF002-Accessibility from any computing device: accessible through desktop computers, laptops, tablets, smartphones
RF003-User administration: administration of user accounts, roles and permissions	RNF003-Service availability: with Cloud Computing services, service availability is 24 h a day, 365 days a year
RF004-Study cycle administration: the timing of the course to be taught is established	RNF004-Availability of updates: with Cloud Computing services, updates are instantaneous and indivisible for the client
RF005-Virtual Classroom Administration: virtual classroom management, user assignment according to role	RNF005-Hardware Scalability: Cloud Computing services, Infrastructure as a Service (IaaS) are scalable in terms of the characteristics of the servers, storage and data security
RF006-Administration of study subjects: management of study subjects, assignment of users according to role	RNF006-Software Scalability: Cloud Computing services, platform as a service (PaaS) maintain availability of components, services, configured APIs available at all stages of development and testing
RF007-Task management: it is the task management for the course	RNF007-Data security: maintain security in the data transport layer through TLS/SSL certificates
RF008-Activities administration: it is the activities management for the course	RNF008-Development with free software: base operating system, framework, server, database, web server and free code libraries will be used
RF009-Assessment administration: it is the evaluation management for the course	RNF009-Web design: the web design is responsive, friendly and easy to use
RF010-Administration of self-assessments: it is the management of self-assessments for the course	
RF011-Test administration: it is the test management for the course	
RF012-Exam administration: it is the administration of exams for the course	
RF013-Notes: control of notes of all tasks, activities, evaluations, self-assessments, tests and exams taken in the study cycle	
RF014-Resource Administration: includes the management for the administration of resources such as aids, questions, documents and outstanding works, digital libraries, digital repositories, wikis, blogs	

(continued)

Table 12.4 (continued)

Functional requirement	Non-functional requirement
RF015-Communication: includes asynchronous learning-oriented tools such as forum, email, calendar; and synchronous as chat, video conference	

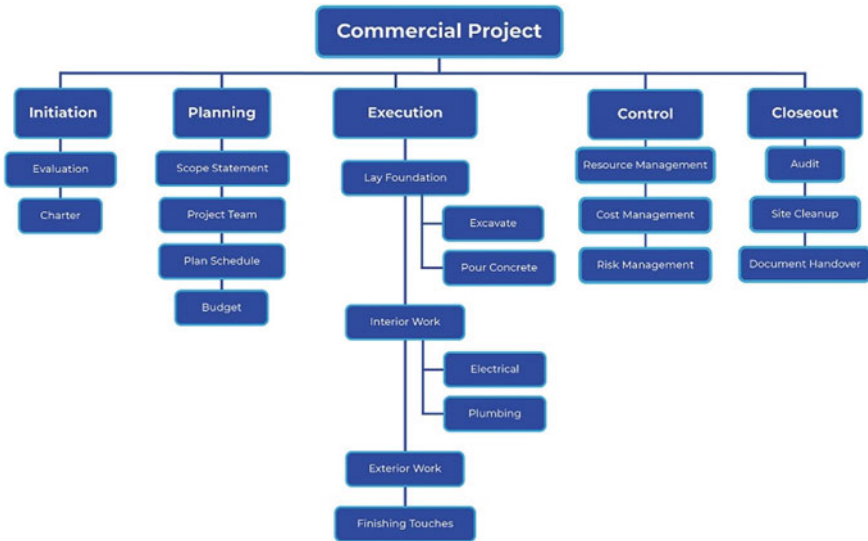


Fig. 12.7 Work Breakdown Structure (WBS)

The EVA Virtual Learning Environment will include an informative web portal, student registration and enrollment, as well as modules for Content Management, Administrative Management, Communication, Collaborative Work and Evaluation.

Work Breakdown Structure (WBS)

The work plan of this project is defined by a WBS—Work Breakdown Structure (EDT) divided into 5 Work Packages WP (Work Packages PT), the same ones that contain Task T, see Fig. 12.7:

WP1—Initiation Phase: the organization authorizes the planning of the project according to the business need. In a Constitution Act they define the purpose of the project, description of roles, success criteria and responsibilities, identification of interested parties and environmental factors.

WP2—Planning Phase: a Scope Management Plan is delivered containing the functional and non-functional requirements, strategic objectives of the organization and purpose of the project.

Table 12.5 Human resource

No.	Role	Quantity	Planned days	Cost days	Amount
1	Product management	1	119	\$90.00	\$10,710.00
2	Product Director	1	110	\$80.00	\$8800.00
3	WP Work Package Leader	5	100	\$60.00	\$30,000.00
4	WP Work Package Task Leader	4	100	\$45.00	\$18,000.00
5	Scrum Master	1	68	\$60.00	\$4080.00
6	Multidisciplinary professionals	3	68	\$40.00	\$860.00
	Total				\$79,750.00

Table 12.6 Hardware resource

No.	Description	Quantity	Unit value	Amount
1	Laptops	12	\$1200.00	\$14,400.00
2	Server	1	\$15,000.00	\$15,000.00
3	Terminals	3	\$1000.00	\$3000.00
	Total			\$32,400.00

WP3—Execution Phase: the Scrum agile framework is used exclusively for software development planning.

WP4—Monitoring and Control Phase: project monitoring and control activities are displayed, the inputs are specified: scope control flow chart, schedule diagram and risk diagram.

WP5—Closure Phase: the formal closure of the project is established.

12.3.2.2 Budget Development

Budget Calculation

The budget estimate focuses on various costs of human resources, hardware resources, software resources and other expenses. The budget in Human Resources for the project is displayed in Table 12.5.

Regarding the Hardware Resource, the information is displayed in Table 12.6

12.3.2.3 Quality Management

PMBOK in its Quality Management addresses policies that seek to implement a Quality Management System in the context of the project, defining 3 clear processes as can be seen in Fig. 12.8.

Fig. 12.8 Quality management processes



However, the very nature of the Scrum agile framework, in the face of constant changes throughout the project life cycle, incorporates periodic controls in the Sprint Retrospective meetings with the purpose of discovering inconsistencies and quality problems early.

Plan Quality Management

The planning of the Quality Management of the project begins by identifying requirements by gathering information such as:

- Act of constitution of the project.
- Registration of interested parties.
- Documentation of requirements.
- Norms and evaluation standards.

Quality Assurance

The quality assurance of the project is carried out by defining and fulfilling the following activities shown in Table 12.7:

12.3.3 Monitoring and Control Phase

12.3.3.1 Scope Control

It is the process that monitors the status of the project and product scope. Scope Control is also used to manage changes, the same ones that are inevitable in any project, see Fig. 12.9 for the process and actions to be taken:

Table 12.7 Activities for quality assurance

No.	Activity	Description
1	Review of deliverables	<ul style="list-style-type: none"> • Review by a team member • Testing of deliverables by Development Team • Review to verify compliance with defined standards and checklist
2	Project fit review	<ul style="list-style-type: none"> • Review of critical products
3	Technical review	<ul style="list-style-type: none"> • Reviews in Scrum Team meetings
4	Critical documentation	Quality requirements on the use of the platform: <ol style="list-style-type: none"> Functionality Reliability Usability Efficiency Maintainability Portability

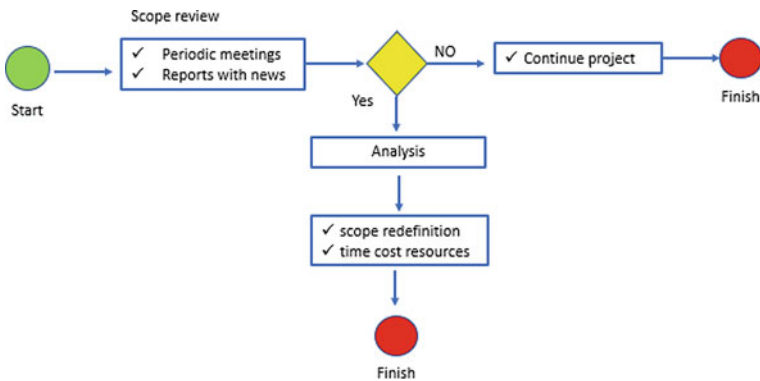


Fig. 12.9 Project scope control source: self-made

12.3.3.2 Schedule Control

It is the process that monitors all the activities planned in the work schedule in order to control and manage any changes, see Fig. 12.10 for the process and actions to be taken:

12.3.3.3 Risk Control

It is the process that allows risk response plans to be used, identified and monitored throughout the life cycle of the project. See Fig. 12.11 for the process and actions to be taken:

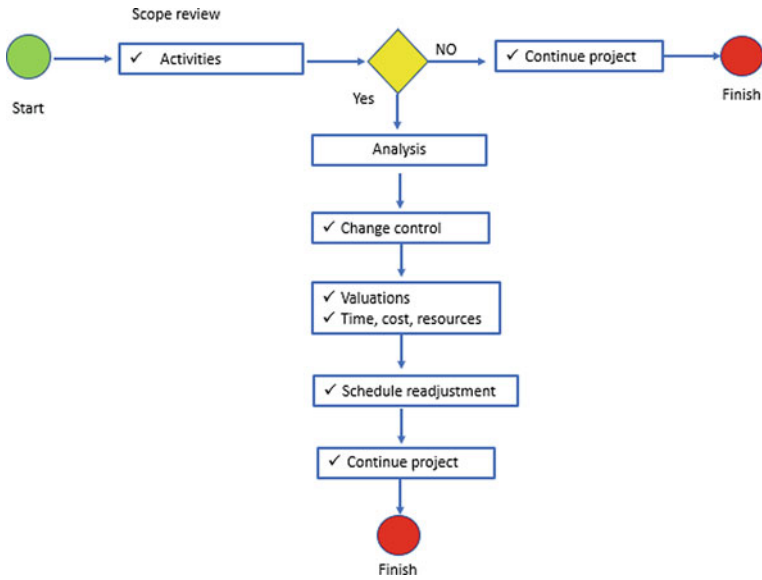


Fig. 12.10 Project schedule control

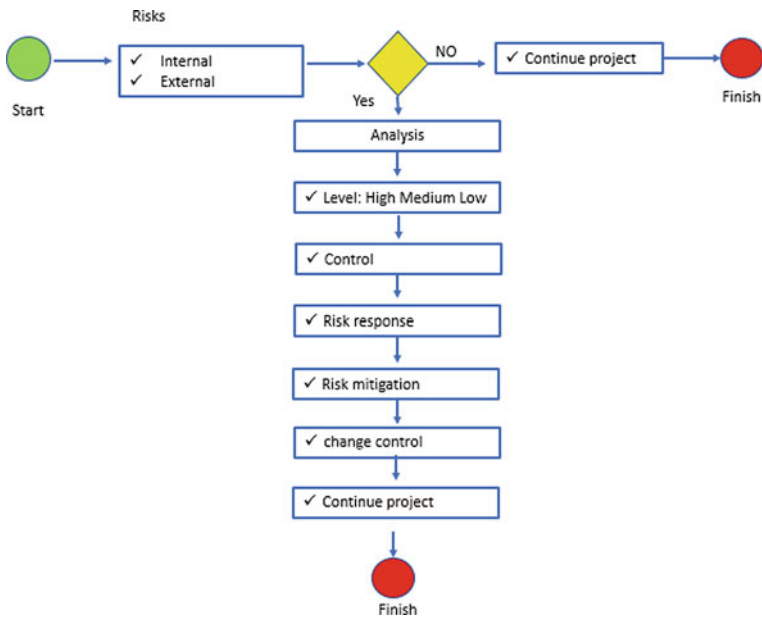


Fig. 12.11 Project risk control source: self-made

12.4 Conclusion

The ANESI with the fulfillment of the planning of the project in investment in technological, technical, logistical and pedagogical infrastructure will be able to become Education and training centers with the virtual study modality.

With the fulfillment of the planning of the present project, it will allow to establish a base work for build and implement a Virtual Learning Environment for the new Training Centers for Security and Private Surveillance agents.

The project meets the requirements and needs of users to be able to train virtually by integrating synchronous and asynchronous communication tools.

Implementing a Virtual Learning Environment in the country will promote the decentralization of the service, eliminating barriers of time and distance, economically benefiting users, reducing transportation costs and improving the flow of applicants for security and surveillance agents.

The project supplements with the use of 3D virtual reality immersion technology, practical modules of the curricular mesh that represents 10% of the required workload.

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