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Expert System to Enhance the Tourist Experience in the Region of Huanuco - Peru

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Abstract: - It is common today to see people use a smartphone, tablet, PC, this is basically due to the growth of technology in the development of computer applications. In recent decades, it has allowed integration with global positioning tools, messaging, mobile device platforms and others, which, when correctly applied, provides an alternative and solution for the objective of this research project.

In relation to the coexistence of mobile devices at home, the study showed that by 2021, 89.3% of Peruvian households have at least one mobile device to connect to the Internet, that is, four out of five Peruvian households have a smartphone, laptop or tablet.

Regarding the preference for operating systems, 85% of Peruvian users use a smartphone with Android system, which is a positive percentage for the claims of this project, compared to 28% who use iOS.

The mobile application will allow anyone who wants to visit the city of Huánuco to find out in advance about all the tourist places that they can visit, the activities that take place in each of them, the restaurants, accommodations distance, thus potentiating the tourism of Huánuco.

Keywords: Expert system, tourist experience, Huánuco, CommonKads.

I. INTRODUCTION

The advanced development of technology has made it possible to use science for the benefit of humanity, making processes increasingly easier and facilitating human activities, this is how this project proposes the use of artificial intelligence to serve tourism, and that by means of an expert system it facilitates the city of Huánuco, to give information to all the tourists, of the best places or places so that they spend a good moment either of rest, extreme activities, cultural or shopping in the different centers commercial etc.

Through the expert system, tourists who visit the city of Huánuco will be able to have the information of the outstanding sites, thus attracting the attention of the visitor. Tourists will have the opportunity to take away a good image of our city by approaching culture, history and social daily life, avoiding the image of insecurity that has hindered these processes in recent decades.

The large number of tourist attractions together with a large amount of information about them on the web and social platforms have complicated the decision-making process to select and visit them. In this sense, tourist recommendation systems have become interesting for tourists, but challenging for designers because they must be able to provide personalized services. This article presents a tourist recommendation system that extracts user preferences to provide personalized recommendations. To do this, the evaluations of the users in the tourist social networks are used as a rich source of information to extract their preferences. The comments are then pre-processed, they are semantically grouped and sentimentally analyzed to detect the preferences of a tourist. Similarly, all aggregated user reviews of an attraction are used to extract the features of these points of interest. Finally, the proposed recommendation system semantically compares a user's preferences with the characteristics of the attractions to suggest the most matching points of interest for the user. In addition, the system uses vital contextual information of time, location, and weather to filter out inappropriate items and increase the quality of current situation suggestions. The proposed recommendation system is developed by Python and evaluated on a data set collected from the TripAdvisor platform.(Abbasi-Moud et al., 2021).

With the development of the Internet, technology and the media, the production of tourist data has multiplied at

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all levels (hotels, restaurants, transport, heritage, tourist events, activities, etc.), especially with the development of the Online Travel Agency. (OTA). However, the list of possibilities that these Web search engines (or even specialized tourist sites) offer to tourists can be overwhelming and relevant results are often drowned out by informational "noise" that impedes, or at least slows down, the selection process. . To assist tourists in trip planning and to help them find the information they are looking for, many recommender systems have been developed. In this article, We present an overview of the various recommendation approaches used in the field of tourism. Based on this study, an architecture and a conceptual framework for a tourist recommendation system is proposed, based on a hybrid recommendation approach. The proposed system goes beyond the recommendation of a list of tourist attractions, adapted to the preferences of tourists. It can be seen as a travel planner designing a detailed program, including heterogeneous tourism resources, for a specific visit duration. The final objective is to develop a recommendation system based on big data technologies, artificial intelligence and operational research to promote tourism in Morocco, specifically in the Daraa-Tafilalet region. (Fararni et al., 2021).

This paper uses an expert-based framework for hybrid in-depth interviews, Fuzzy Delphi Method (FDM), Analytical Network Process (ANP), Weighted Linear Combination (WLC) to assess cultural tourism strategies for the district. Fucheng landmark in Tainan City, Taiwan. A set of indicators was proposed through in-depth interviews with experts. Then, FDM was used to select criteria, subcriteria. Weight-based calculation through ANP showed that historical and cultural value has a high priority in the criteria, while cultural assets and preservation of historic buildings are significant sub-criteria. Besides, We found that "Cultural and Creative Clusters" are a priority strategy to be adopted in cultural tourism based on historical routes. Finally, WLC indicated that Route VI is the most suitable route to organize "cultural and creative clusters". To call for the sustainable implementation of tourism development, the proposed modeling approach is an effective tool that provides a comprehensive understanding to develop tourism strategies.(Lin et al., 2021).

II. RESEARCH METHOD AND DESIGN

Method

The present investigation used the inductive method, using the reasoning that starts from a series of observations to a sample population that allowed us to generate laws and general conclusions.

Goals

General

Develop a virtual assistant to enhance the tourist experience in the city of Huánuco.

Specific

Execute the diagnosis of tourist orientation in the city of Huánuco, in order to obtain the functional and technical specifications that will be part of the proposed technological solution.

Develop a mobile application, based on the CommonKADS methodology in its design and free software with mobile technology in its development.

Validate and verify the results obtained from the implementation of the virtual assistant.

Scope

This project will reach the implementation of the knowledge base.

The knowledge base will contain the information of the main tourist sites of the city of Huánuco.

The analysis and design of the application will be carried out.

The application will be developed.

Study variables

Dependent variable:

Heritage tourist experience of the city of Huánuco.

The concept of tourism has had various interpretations and has been defined by various authors. One of the most complete and concise definitions is the following.

Tourism is a social, cultural and economic phenomenon that involves the displacement of people to countries or places outside their usual environment for personal, professional or business reasons. These people are called travelers (who can be either tourists or excursionists; residents or non-residents) and tourism encompasses their activities, some of which involve tourism expenditure. (Glossary of tourism terms | UNWTO, nd).

Independent variable:

Virtual assistant

A Virtual Assistant is a set of computer programs capable of interacting with human beings through natural language, this is possible thanks to the use of a branch of Artificial Intelligence known as PLN (Natural Language Processing), which deals with how machines can understand the language of man (Dorfman, Grondona, Mazza, & Mazza, 2011). We can find other terms to refer to a virtual assistant, such as: intelligent computational agent, chatbot, chatterbot, bot or chat robot, among others. In addition, it is 23 capable of simulating an intelligent conversation through text and/or audio, which a user could have with a real person (Dorfman et al., 2011).

Type

Exploratory investigation

Methodology

CommonKADS

CommonKads Methodology Life Cycle

CommonKADS is based on the spiral life cycle model that is widely used in Software Engineering and that provides a structure for the development of the computerized system:

Development is divided into a set of phases with a predetermined order of execution.

Within each phase, a different set of activities must be carried out.

At the end of each phase, one or more tangible products (eg, documents, reports, designs, programs) are to be produced, usually as inputs to other phases.

The methodology is made up of a series of stages, each with associated tasks and products. They are:

The analysis

It is done to understand the problem from the point of view of the solution to be developed. It is formed by the specification of the external requirements of the knowledge-based system and by an analysis of the specific problem. The products that must be obtained at this stage are: a project document, a requirements document, a model document (conceptual model), a feasibility document and a supporting document.

Design

In which a description of the behavior of the system (functional description) and a physical description in which each of its components is specified in detail. The entire modular specification of the system and the detailed description of how it should be, from the computerized point of view, should come out of this stage.

Facility

It consists of starting up the system in order to begin operating in the company, beginning its production process.

The use

Activities related to the management of the system itself and the outputs or results it provides are proposed.

CommonKADS Structure

Organization Model

Opportunities to implement knowledge systems are analyzed. Its feasibility is established and the impact it can have on the company is determined.

Task Model

The global disposition of the processes, their inputs and outputs, the relationships with the environment and the resources and response capacities of production are analyzed.

Agent Model

It describes the characteristics of the agents, in particular, their capabilities and authority to act. Agents are executors of a task. An agent can be a human, an information system, or any other entity capable of performing a task.

Knowledge Model

It is to explain in detail the types and structures of knowledge used in the execution of a task within a process, as well as the reasoning processes used by experts to solve the problems presented in the processes. This model represents the task, the inferences, the knowledge domain schema, and the knowledge base of the expert system.

Communications Model

It models the communicative transactions between the agents involved in the development of the process and in the design model all the previous models are gathered, to conform the technical specifications in terms of the architecture of the computation mechanisms needed, to put the functions of the models of knowledge and communication.

Design Model

It is used to describe the architecture and technical design of the knowledge-based system prior to its implementation.

III. WORK METHODOLOGIES

Requirements elicitations with the REM tool

Functional requirements

Table 1. Authenticate entry

FRQ-0001	**Authenticate administrator login**
Version	1.0
dependencies	None
Description	The administrator enters his credentials to later touch the application button and validate his data entered in the username and password fields.
Importance	Important
Urgency	Immediately
State	Pending verification
Stability	high
Comments	None

Source: self made.

Table 2. Register information of points of interest

FRQ-0002	Record points of interest information
Version	1.0
dependencies	None
Description	The administrator must be logged in to the application then enter the input information in the form fields. Then the user clicks on the "Create" button, the system saves the information entered in the form in the database.
Importance	Important
Urgency	Immediately
State	Pending verification
Stability	high
Comments	None

Source: self made.

Table 3. Consult list of points of interest

FRQ-0003	Consult list of points of interest
Version	1.0
dependencies	None

Description	The user consults the chatbot's suggestions of possible places of interest.
Importance	Important
Urgency	Immediately
State	Pending verification
Stability	high
Comments	None

Source: self made.

Table 4. Show information of points of interest

FRQ-0004	Show points of interest information
Version	1.0
dependencies	None
Description	The user clicks on one of the points of interest, where they will be shown the detailed information of the selected place.
Importance	Important
Urgency	Immediately
State	Pending verification
Stability	high
Comments	None

Source: self made.

Table 5. Consult location of the point of interest

FRQ-0005	Check location of the point of interest
Version	1.0
dependencies	None
Description	Through the chatbot, the user consults the location of the place they want to visit.
Importance	Important
Urgency	Immediately
State	Pending verification
Stability	high
Comments	None

Source: self made.

Non-functional requirements

Table 6. Security

FRQ-0006	Security
Version	1.0
dependencies	None
Description	System ownership against unauthorized access, alteration and destruction of information.
Importance	Important
Urgency	Immediately
State	Pending verification
Stability	high
Comments	None

Source: self made.

Table 7. Maintainability

FRQ-0007	maintainability
Version	1.0
dependencies	None
Description	It is the ease with which the system can be modified to correct faults, improve performance or other attributes, or adapt to changes in the environment.
Importance	Important
Urgency	Immediately
State	Pending verification
Stability	high
Comments	None

Source: self made.

System modeling using Modified Modeling Language (UML) in CommonKADS

Table 8. Actor expert in tourism

ACTOR	TOURISM EXPERT	IDENTIFIER: A01
Description	It is in charge of providing the necessary information for the correct filling of the information of the tourist places.	
Characteristics	Expert in the area of tourism.	
Relationship	Recognizes and informs about places.	
Reference	The actor has access to the system in the information part.	

Source: self made

Table 9. Actor programmer

ACTOR	PROGRAMMER	IDENTIFIER: A02
Description	It is the person who develops the program to automate the storage, allowing users to enter and register the different tourist places.	
Characteristics	Analytical capacity to understand the problems that arise by applying logic and using skills to solve different problems taking into account the capabilities and limitations of the system.	
Relationship	He will be in charge of developing and executing the system according to the administrator's specifications.	
Reference	The programmer will be able to modify any aspect of the system.	

Source: self made

Table 10. Actor administrator

ACTOR	ADMINISTRATOR	IDENTIFIER: A03
Description	It is in charge of compiling the necessary information for the correct filling of the information of the tourist places.	
Characteristics	Expert in managing the application.	
Relationship	Check and add the tourist places.	
Reference	The actor has full access to the system.	

Source: self made

Table 11. Client actor

ACTOR	CUSTOMER	IDENTIFIER: A04
Description	It is the user of the system.	
Characteristics	Person interested in knowing the points or tourist places of the city of Huánuco.	
Relationship	They will be the person who uses the interface and visualizes the information, as well as interacting with the chatbot.	
Reference	The actor can only view and interact with the system.	

Source: self made

IV. RESULTS

Knowledge engineering with CommonKADS

OM-1: *Identification of knowledge-oriented problems and opportunities.*

Table 12. Organization model

Organization Model	Problems and Opportunities
problems and opportunities	Problems: Obtaining and validating data will take a long time. The system will depend in part on user feedback and this information will need to be validated.

	Some data must be updated continuously. Opportunities: Promote the permanent use of all the assets of a territory, through a virtual tourism assistant that improves the service to the visitor: before, during and after their visit. The application of effective technologies for the tourism sector. Improve the promotion of the destination, visitor assistance during the visit and the relationship with the visitor after the visit. Improve and validate the information and services provided to tourists
Organizational Context	Mission: Plan to promote and strengthen the development of tourist activity to position the city of Huánuco through the recommendations and promotions of its image, tourist destinations, typical dishes, export products contributing to the sustainable and decentralized development of the city. Vision: To be a number one expert system in providing the necessary information for the choice of tourist places to travel in the city of Huánuco. Objectives of the organization: Offer an excellent virtual assistant to our users in order to improve their tourist experience. Promote tourism in our region and impose a trend of consumption of goods and services linked to tourism that is innovative, profitable and respectful. External factors: - The presence of social networks by the community, and tourism advertising in the region. - Geography and environmental conditions. - Policy and legal issues. - Technological trends and customer or user preferences. - Seasonal factors, some activities are only possible in certain months of the year. Organization strategy: We prioritize user satisfaction by providing interesting and relevant information on tourist sites and services offered in the area. Value chain and main value drivers: Annex 1.
Solutions	Provide a virtual assistant to enhance the heritage tourist experience in the city of Huánuco, the assistant must be updated according to the recommendations of the users and the changes that have occurred over time

Own source

OM-2: Description of the aspects of the organization that have an impact on or are affected by the chosen problem.

Table 13. Description of the area of interest of the organization.

Organization Model Description of the key area of the organization	**Organization Model Description of the key area of the organization**
Structure	**Appendix 2**
processes	**Annex 3**
People	**Knowledge Providers:**Historians, tour guides, etc. **Knowledge Engineers:** Development group members will take multiple roles throughout development.
Resources	**Material and technological resources:** Internet. Historical books and articles. Personal computer. OS. Personal hosting. servers. Development environment. **Human Resources** The development group.
Knowledge	Knowledge about development. Knowledge of tourist supply and demand in Huánuco. Know the tourist planning process. Know the benefits of tourist

	services and avoid tourist fraud.
culture and power	The group has a structure that promotes leadership, collaboration, integrity and responsibility.

Source: Own.

OM-3: Description of the process from the point of view of the tasks in which it is composed and its main characteristics.

Table 14. Communication model

Description	**Description of the key area of the organization**
communication model	The knowledge system contains tourist places that Huanuco has, to which you can make a trip to learn and experience.
known fonts used	The sources that were used for the choice of places have been mainly: The experience of tours, as a base of places that have already been visited. Recommendation of the citizens who live nearby.
Components	Technological base was found for other virtual assistants.
Considered scenarios	Places where access is accessible to tourists have been selected.
Validation results	Trips will be simulated where the routes will be.
Knowledge acquisition material	Travel experiences and information obtained by citizens.

Own source.

AM-1: Agent Specifications

An agent is an executor of a task. It can be human, software or any other entity capable of performing a task. This model describes the powers, characteristics, authority and restrictions to act of the agents.

Table 15. List of agents.

Agent	**Description**
Managing Agent	It is the agent that represents the administrator within the system that will have permissions to create and modify users and their interaction between them.
User Agent	It is the interested party who will consult the location, information, schedules and services provided by tourist places.
Expert Agent	It is the one that will update and enter new data into the system about tourist places or various services that surround it.
Agent Search	It is the actor that will provide the information about the searches.
Filter Agent	It is the agent that represents the filter that will be required to form sentences with sense and to be able to analyze them.
Agent Profile	Refers to the agent that manages user preferences.
Agent Expert Profile	The agent that manages the modifications to the information made by the expert.

Own source.

Table 16. User Agent

Agent User	
Type	Navigation Interface Agent
Paper	Navigation interface
Position	It is within the society of system agents
Ability, reasoning and experience	● Ability to receive user input. ● Graphic interaction capacity.
Description: This agent performs various activities such as: ● Manages user input into the system. ● It manages the interfaces of the start and login of the user. ● Graphically displays the requested information to the user.	
Aim: That the user can navigate in the system.	
Services: ● Receive user data. ● Show data outputs in your interface. ● Enter user data into the system.	
Communication: Direct communication with the user.	
Coordination: Agent Profile.	
Input parameters: Information entered into the interface by the user.	
Output parameters: Information transmitted by the user.	

Own source.

Table 17. Agent Profile

Agent Profile	
Type	Intelligent software agent.
Paper	User profile.
Position	It is within the society of system agents.
Ability, reasoning and experience	● Ability to adapt to the user's profile. ● You can communicate with the other agents in a defined language.
Description: This agent performs various activities such as: ● Manages the database of user profiles. ● Organize the search for user profiles. ● Verify user data and share it with other agents.	
Aim: Manage different user profiles.	
Services: ● Validate user login ● Update user profile ● Search user profile	
Communication: It does not communicate with any user directly.	
Coordination: user agent filter agent	
Input parameters: User profile information to register or modify.	
Output parameters: User login verification. User profile information.	

Own source.

Table 18. Administrator Agent

Agent Administrator	
Type	Modification Interface Agent.
Paper	Modification General Profile.

Position	It is the agent with the most permissions to modify the system.
Ability, reasoning and experience	● Modification of the total information stored in the system. ● Full control of system profiles.
Description: This agent performs various activities such as: ● Manage system profiles. ● Verify new information registered in the database.	
Aim: Be able to manage system data correctly.	
Services: ● Corrects stored data, or error information in the system.	
Communication: You can communicate with the different users of the system.	
Coordination: User Agent Expert Agent	
Input parameters: Access verification data	
Output parameters: None	

Own source.

Table 19. Expert Agent

Agent Expert	
Type	Information Registration Interface Agent.
Paper	Interface for the registration of new information.
Position	It is within the society of system agents.
Ability, experience and reasoning	● Ability to receive expert data input. ● Graphic interaction capacity.
Description: This agent performs various activities such as: ● Register and modify information of the places registered in the system.	
Aim: Manage different user profiles.	
Services: Receive data from the expert. Show data outputs in your interface.	
Communication: You can communicate with the different users of the system.	
Coordination: Agent Administrator profile.	
Input parameters: Information entered into the interface by the expert.	
Output parameters: Information transmitted by the expert.	

Own source.

Table 20. Filter Agent

Agent Filter	
Type	Information filter software agent.
Paper	.Filter
Position	It is within the society of system agents
Ability, experience and reasoning	● Ability to filter text input entered by the user
Description: This agent performs various activities such as: ● Filter the text for the correct search of the requested information.	
Objective: Manage that the information input is read correctly.	
Services: ● Filter entered text. ● check text input.	
Communication: It has no communication directly with a human.	

Coordination: Agent Profile. Seeker Agent
Input parameters: Text information entered.
Output parameters: Filtered text by parameters. Verification of entered text.

Own source.

Table 21. Search Agent

Agent Search	
Type	Information search agent.
Paper	Data search.
Position	It is within the society of system agents.
Ability, experience and reasoning	● Ability to receive filtered text input. ● Search for information in the database.
Description: This agent performs activities such as: ● the search for information requested by the user in the database. ● Send the information and its type for the correct sample of data.	
Aim: Manage that the search for information is coherent and correct with respect to what is requested.	
Services: Sending information generated from the database. Verification of the existence of information.	
Communication: It has no direct communication with a human.	
Coordination: Filter Agent	
Input parameters: Filtered text.	
Output parameters: Requested information.	

Own source.

OTA-1: Checklist for decisions on impact and improvements. Task model.

Table 22. Task TM-1 Profile creation

Task Model	Task Analysis Sheet TM-1
Task	**CREATION OF PROFILES**
Objective and Value	Starts the interaction between users depending on the type of user.
Dependency and Flows	Next task: Profile management.
Manipulated objects	**Input objects:** Role of users, dates, personal data. **output objects:** Registration of User data. **internal objects:** Rules of programming logic.
Time and Control	**Frequency:** Variable according to the number of users. **Duration:** Variable according to the duration of the task. **Control:** It will be carried out by the previously established programming logic.
Agents	Profile Agent, User Agent.
Knowledge and skills	Previous knowledge of the development team.
Resources	Data entry equipment, software.
Quality and Efficiency	The fulfillment of the task is expected to be quick.

Own source.

Table 23. Task TM-2 Profile management

Task Model	Task Analysis Sheet TM-2
Task	**PROFILE MANAGEMENT**

Objective and Value	The objective of the task is to categorize profiles to provide multiple functions depending on each profile.
Dependency and Flows	Previous task: Profile creation. Next Task: Initial evaluation.
Manipulated objects	**Input objects:** Role of users, dates, personal data. **output objects:** User preferences, searches, location and information preferences. **internal objects:** Rules of programming logic.
Time and Control	**Frequency:** Variable according to the number of users. **Duration:** Variable according to the duration of the task. **Control:** It will be carried out by the previously established programming logic.
Agents	Profile agent, Expert profile agent, Administrator agent, Filter agent, Search agent.
Knowledge and ability	Previous knowledge of the development team, knowledge of experts (historical places, customs, etc.).
Resources	Data entry equipment, software.
Quality and Efficiency	The fulfillment of the task is expected to be quick.

Own source.

Table 24. Task TM-3 Initial evaluation of users

Task Model	Task Analysis Sheet TM-3
Task	**INITIAL USER EVALUATION**
Objective and Value	The goal of the task is to collect data from the user to provide relevant information.
Dependency and Flows	Previous task: Profile management. Next task: Resource suggestion.
Manipulated objects	**Input objects:**Role of users, dates, personal data, preferences and selection of activities and places to visit. **output objects:**User preferences, searches, location and information preferences, places you want to visit and services you intend to use. **internal objects:**Rules of programming logic.
Time and Control	**Frequency:** Variable according to the number of users. **Duration:** Variable according to the duration of the task. **Control:** It will be carried out by the previously established programming logic.
Agents	Profile agent, Filter agent, Search agent.
Knowledge and ability	Previous knowledge of the development team, knowledge of experts (historical places, customs, etc.).
Resources	Data entry equipment, software.
Quality and Efficiency	The fulfillment of the task is expected to be quick.

Own source.

Table 25. Task TM-4 Resource suggestion

Task Model	Task Analysis Sheet TM-4
Task	**RESOURCE SUGGESTION**
Objective and Value	The objective of the task is to provide data requested by the user or deducted based on their preferences previously entered into the system.
Dependency and Flows	Previous task: Initial user evaluation.
Manipulated objects	**Input objects:**Role of users, dates, personal data, preferences and selection of activities and places to visit. **output objects:**Locations and information that could satisfy the tastes or needs of the user.

	internal objects: Rules of programming logic.
Time and Control	**Frequency:** Variable according to the number of users. **Duration:** Variable according to the duration of the task. **Control:** It will be carried out by the previously established programming logic.
Agents	Profile agent, Expert profile agent, Administrator agent, Filter agent, Search agent.
Knowledge and ability	Previous knowledge of the development team, knowledge of experts (historical places, customs, etc.).
Resources	Data entry equipment, software.
Quality and Efficiency	The fulfillment of the task is expected to be quick.

Own source.

Knowledge Model (Expertise or Experience - EM)

This is the heart of the commonKADS methodology and models the problem-solving knowledge employed by an agent to perform a task. The experience model distinguishes between application knowledge and problem solving knowledge. Application knowledge is divided into three sublevels: domain level (declarative knowledge about the domain), inference level (a library of generic inference structures), and task level (order of inferences).

Table 26. Knowledge model

Task where is object	**Knowledge about the domain**
Start of Dialogue	CONCEPT start; DESCRIPTION; “Conversation start”; ATTRIBUTES: greetings: STRING; category: STRING; category_quantity: INT; … END CONCEPT Start;
Get user data	CONCEPT User; DESCRIPTION: ”Get user data”; ATTRIBUTES: name: STRING; surname: STRING; id: STRING; … END CONCEPT User;
Describe places	CONCEPT describePlaces; DESCRIPTION: ”Description of the places”; ATTRIBUTES: sendPlaces: STRING; category: STRING; idPlaces: STRING; context: STRING; END CONCEPT describePlaces;
Trip development	CONCEPT development travel; DESCRIPTION: ”Development of the trip to the place”; ATTRIBUTES: asks: STRING; response: STRING; category: STRING; context: STRING; … AXIOM S: conditional_plus: STRING; END CONCEPT developmentTravel;
Identify closure	CONCEPT Closing; DESCRIPTION: ”Identify closure ”; ATTRIBUTES: word: STRING; response: STRING; AXIOMS: information_conditional: STRING; value_conditional: STRING; END CONCEPT Close;

Select information	CONCEPT information; DESCRIPTION: ”Select information ”; ATTRIBUTES: information: STRING; AXIOMS: value_conditional: STRING; END CONCEPT information;
Rate Service	CONCEPT Assessment; DESCRIPTION: ”Rate service”; ATTRIBUTES: qualification: STRING; END CONCEPT Valuation;

Communications Model

Table 27. CM-1 Profile creation.

Communication Model	Sheet CM-1: Transaction Description
Identifier/ Transaction Name	CM PROFILE CREATION
Information Object	Create a new profile for the application
Agents Involved	Profile Agent, User Agent.
Communication plan	Complete form
Restrictions	Requested data only
Information Exchange Specification	Personal data that was requested in the form

Table 28. CM-2 Profile management.

Communication Model	Sheet CM-2: Transaction Description
Identifier/ Transaction Name	CM PROFILE MANAGEMENT
Information Object	Categorize profiles to provide multiple features
Agents Involved	Profile agent, Expert profile agent, Administrator agent, Filter agent, Search agent.
Communication plan	Sharing of user information
Restrictions	Only data uploaded to the system
Information Exchange Specification	Data required for a category change

Table 28. CM-3 Initial evaluation of users.

Communication Model	Sheet CM-3: Transaction Description
Identifier/ Transaction Name	CM INITIAL EVALUATION OF USERS
Information Object	Get customer preference data
Agents Involved	Profile agent, Filter agent, Search agent
Communication plan	Complete Initial Assessment
Restrictions	Answer all questions

Information Exchange Specification	Give the preferred data for a better recommendation from the application

Table 29. CM-4 Suggested resources.

Communication Model	Sheet CM-4: Transaction Description
Identifier/ Transaction Name	CM SUGGESTED RESOURCES
Information Object	Recommend, through the data collected, the preferences of customers
Agents Involved	Profile agent, Filter agent, Search agent
Communication plan	Show possible places that may be liked by the user.
Restrictions	Recommend based on specific data.
Information Exchange Specification	Show images of the various options for the user's choice.

V. CONCLUSION

Conclusions:

The results that we arrive with the development of this virtual assistant to potentiate the tourist experience of the region are the next:

The virtual assistant "Turistea" will allow us to promote tourism in our region of Huánuco.

The virtual assistant "Turistea" will allow us to Potentiate the industries linked to tourism (Restaurants, hotels, and associated businesses)

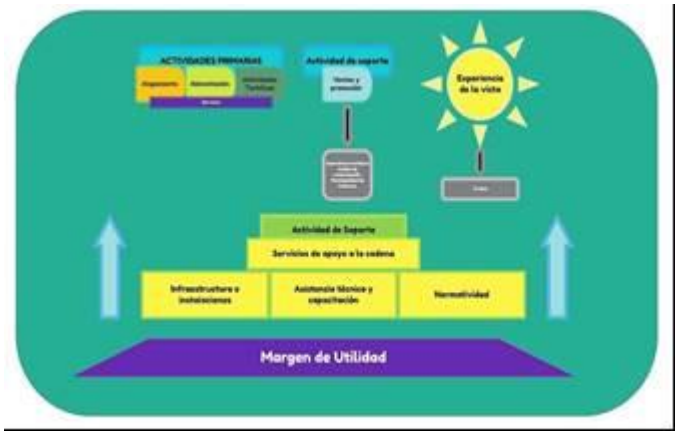
The virtual assistant "Turistea" will allow us to promote the cultural diversity of the Huánuco region.

Recommendations:

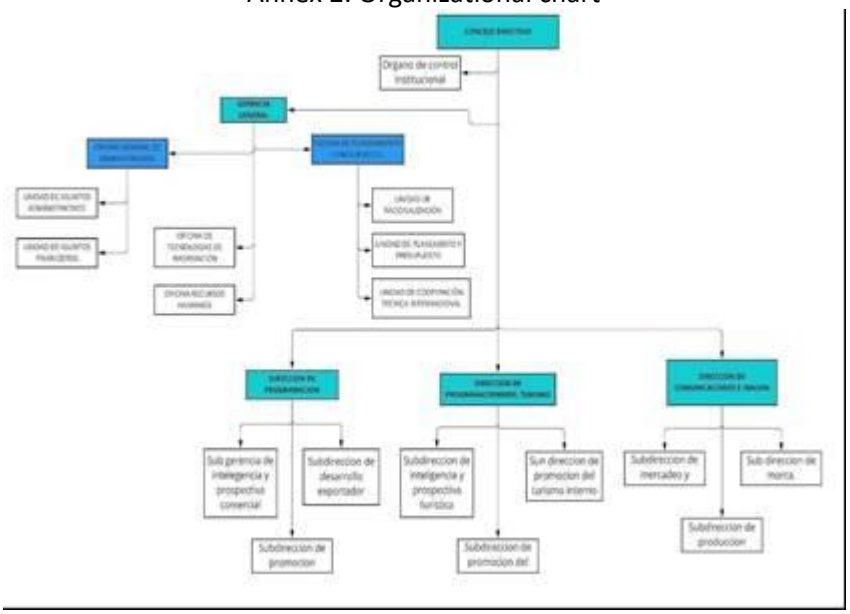
In the preparation of any plan, it is important to form a multidisciplinary work team that contributes with their experiences in the construction of a planning tool; however, it is important to form an evaluation and follow-up committee that monitors and complies with the activities contemplated in the action plan. The members of the Monitoring and Evaluation Committee of the Tourism Development Plan were elected, who are responsible for following up, monitoring and evaluating the actions and restructuring, if necessary, what is considered to be changed, since the actions have been proposals among all the actors who participated in the elaboration of this plan. In the elaboration of the virtual assistant "TOURISTEA" we realized that to make a trip to some place we recommend the tourist to look for information in the application the tourist places exist in their travel destination since these assistants provide efficient information in order to appreciate and enjoy a good trip.

VI. ANNEXES

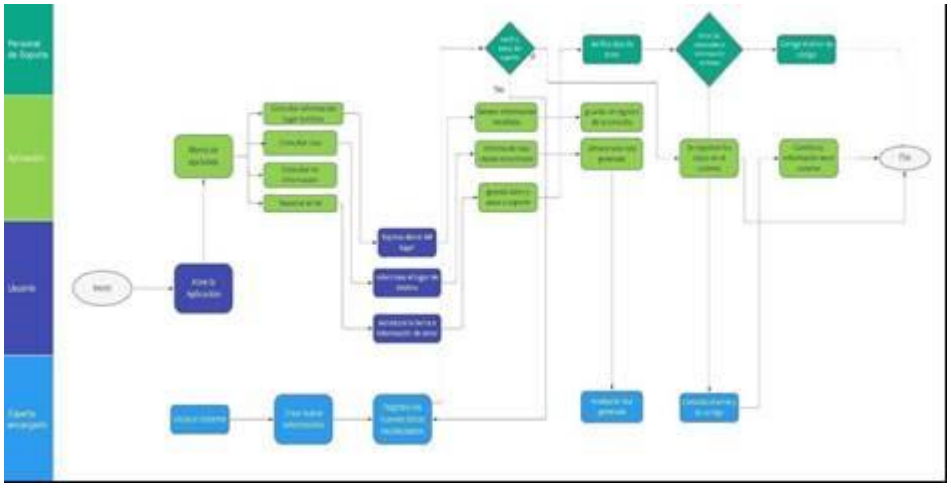
Annex 1: Value chain



Annex 2: Organizational chart



Annex 3: Processes



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