Requisitos de software

Claudia Elena Durango Vanegas
claudia.durango@usbmed.edu.co
Oficina 409C
Teléfono 514 56 00 extensión 4165
Telegram @cedurangov

Objetivos

- General
  - Adquirir conocimientos de elaboración de proyectos de software para las primeras fases del ciclo de desarrollo de software, para solucionar problemas particulares de una organización.

- Objetivos Específicos
  - Identificar el dominio de un problema de desarrollo de software, reconociendo los problemas y el entorno organizacional.
  - Conceptualizar una solución informática considerando los problemas de la organización.
  - Especificar la solución empleando métodos formales y semiformales

Unidad I. Introducción a la ingeniería de requisitos

Definiciones Importantes

Elaborado por Claudia Elena Durango Vanegas

¿Qué es Software?

- Programas de ordenador y la documentación asociada. Los productos de software se pueden desarrollar para algún cliente o para un mercado general.

Sommerville, I. (2005). *Ingeniería del software*. Pearson Educación.

¿Qué es Ingeniería de Software?

- Es una disciplina de ingeniería que comprende todos los aspectos de la producción de software.

- Comprende las formas prácticas para desarrollar y entregar un software.

Sommerville, I. (2005). *Ingeniería del software*. Pearson Educación.

¿Qué son los métodos de ingeniería de software?

- Son enfoques estructurados para el desarrollo de software que incluyen modelo de sistemas, notaciones, reglas, sugerencias y guías de procesos.

Sommerville, I. (2005). *Ingeniería del software*. Pearson Educación.

¿Qué es ingeniería de requisitos?

- Aplicación disciplinada de principios científicos y técnicas para desarrollar, comunicar y gestionar requisitos [Christel y Kang 1992]

- El proceso sistemático de desarrollar requisitos mediante un proceso iterativo y cooperativo de analizar el problema, documentar las observaciones resultantes en varios formatos de representación y comprobar la precisión del conocimiento obtenido [Christel y Kang 1992]

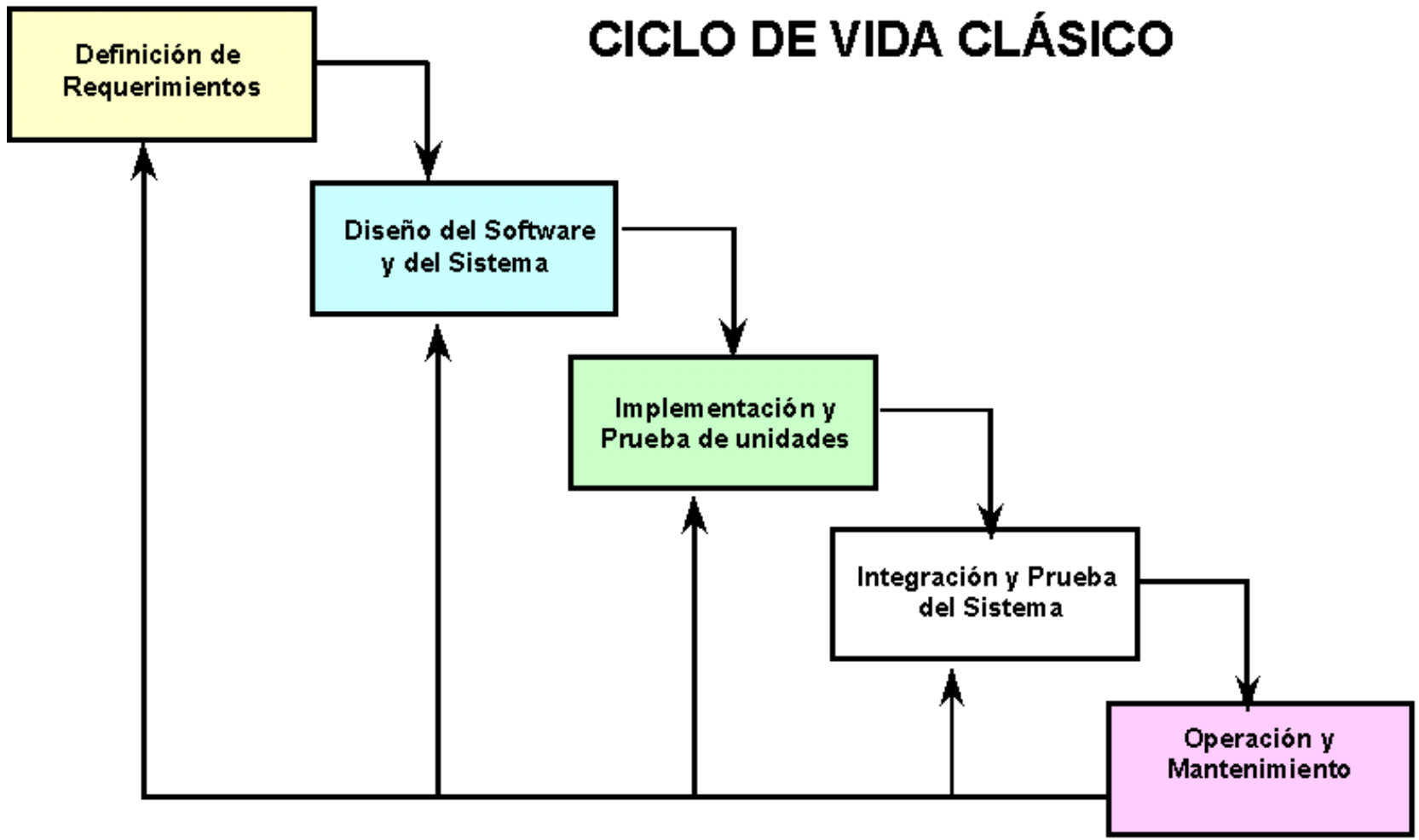
- Un proceso sistemático de desarrollo de requisitos mediante un proceso cooperativo consistente en analizar el problema, documentar las observaciones resultantes en una variedad de formatos de representación, y comprobar la exactitud de la comprensión conseguida [Loucopoulus y Karakostas, 1995]

- Un proceso de descubrimiento y comunicación de las necesidades de clientes y usuarios y la gestión de los cambios en dichas necesidades [Durán, 2000]

¿Qué métodos de ingeniería de software conoce?

- RUP
- FDD
- XP
- SCRUM
- CRYSTAL
- Kanban (software) development
- CMMI
- ISO 25000
- ISO 29110
- SDLC 3.0
- Scaled Agile Framework® SAFe
- Disciplined Agile Delivery DAD
- Essent Project Implementation Cycle EPIC™

Ciclo de desarrollo



Referencias

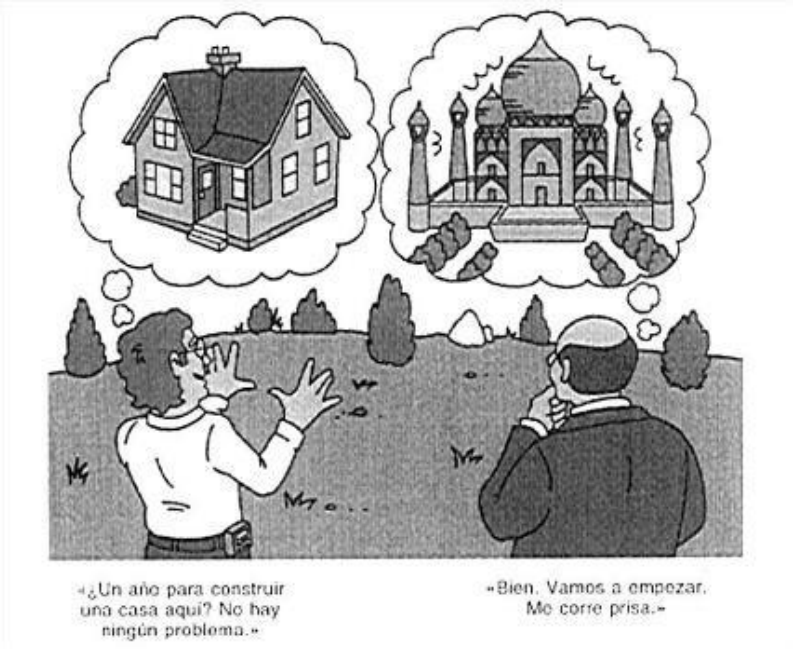
- Sommerville, I. (2005). *Ingeniería del software*. Pearson Educación.
- Al-Khanjari, Z. A. S. (2014). Proposing a systematic approach to verify software requirements. *Journal of Software Engineering and Applications*, *7*(04), 218.
- Loucopoulos, P. y Karakostas, V. (1995). System requirements engineering. McGraw-Hill, Inc.
- Zapata, C. M. (2012). The UNC-Method revisited: elements of the new approach. *Saarbrücken: Lambert Academic Publishing*.
- Zapata Jaramillo, C. M. y Arango Isaza, F. (2009). The UNC-method: a problem-based software development method. Ingeniería e Investigación, 29(1), 69-75.
- Vélez, S. O. (2012). UNC-WEB-METHOD: Una adaptación al UNC-METHOD con miras al desarrollo de aplicaciones web.
- Montoya-Suárez, L. M. yPulgarín-Mejía, E. (2013). Enseñanza en la Ingeniería de software: aproximación a un estado del arte. Lámpsakos, (10), 76-91.

Educción de Requisitos

No existe un proceso de software universal que sea efectivo para todos los contextos de proyectos de desarrollo

Conceptos básicos

Aprender a realizar investigación a conciencia para tratar de conocer todos los requisitos e implicaciones del proyecto de software



Requisitos

- **Definición**: son descripciones de lo que el sistema debe hacer: el servicio que ofrece y las restricciones en su operación.

- El proceso de descubrir, analizar, documentar y verificar los servicios y restricciones se llama Ingeniería de Requisitos o Requisitos de software.

Ingeniería de Requisitos

- La ingeniería de requisitos es una de las etapas cruciales en un proyecto de software y comprende la definición o educción de requisitos y la elaboración del modelo conceptual del sistema.

4 Procesos

La ejecución de estos procesos no es estrictamente secuencial ni independiente, sino que estos procesos se pueden interrelacionar y realizar repetidamente

Requisitos

Características de los Requisitos

- Deben ser
  - Correctos
  - Consistentes
  - Completos
  - Realistas
  - Descriptivos
  - Verificables
  - Rastreables

Tomados de IEEE Std 830-1998

Ingeniería de Requisitos

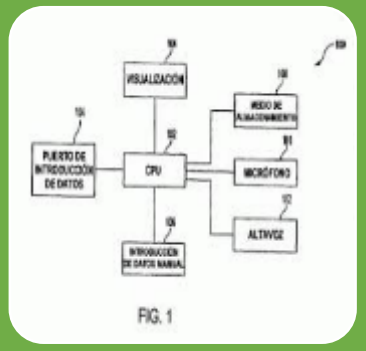
Educción

- Los Interesados descubren, articulan y entienden sus requisitos y/o necesidades.

Análisis

- El Ingeniero de requisitos detalla y organiza los requisitos de los interesados, realiza evaluaciones para encontrar conflictos o inconsistencias e identifica requisitos faltantes.

Ingeniería de Requisitos



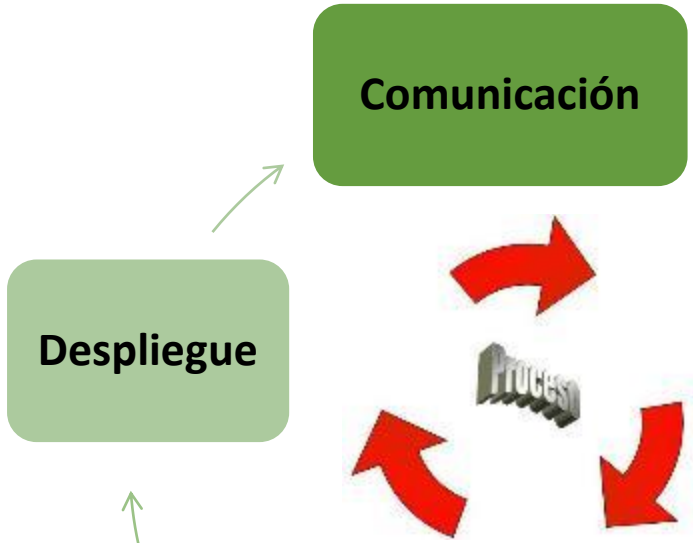
Especificaciones

- El Ingeniero de requisitos realiza una formulación precisa de los requisitos de los interesados, utilizando una notación y una forma de documentar que se basa en el lenguaje natural y en expresiones simbólicas y gráficas.

Validación

- Los interesados validan que la especificación de los requisitos y la documentación elaborada es consistente, correcta y completa con las necesidades del negocio.

Proceso Ingeniería de Requisitos



Comunicación e Investigación de requisitos

Plan de trabajo: riesgos, recursos, productos y programa de trabajo

Modelos para mejorar el entendimiento de los requisitos y el diseño

Generar código y pruebas

Entrega al cliente, **evalúa** el producto y proporciona información

Ingenieria de requisitos.

El proceso de ingeniería de requisitos consta de 4 actividades.

- Extraccion.
  - Representa el comienzo de cada ciclo. Son las actividades involucradas en el el descubrimiento de los requisitos del sistema.
  - Los analistas de requisitos trabajan junto al cliente para descubrir el problema que debe resolver el sistema, los servicios que prestará, las posibles restricciones, etcétera.
- Analisis.
  - Esta fase se enfoca en descubrir problemas con los requisitos de sistema ya identificados. Usualmente de hace un analisis luego de haber producido un bosquejo inicial del documento de requerimientos.
- Especificacion.
  - En esta fase se documentan los requisitos acordaros con el diente.
- Validacion.
  - Es la etapa final de la Ing. de Requsitos. Se verifican los requisitos para asegurar que sean consistentes y esten completos

Los principales beneficios de la Ing. de requisitos son:

- Gestionar las necesidades del proyecto de forma estructurada.
- Mejora la capacidad de predecir cronogramas de proyectos, así como sus resultados.
- Mejora la calidad del software, al cumplirse los requerimientos de funcionamiento óptimo.
- Evita el rechazo del usuario final, ya que obliga a los clientes a verificar los requisitos.

La definicion que nos da el IEEE es:

- "Condicion o necesidad de un usuario para resolver un problema o alcanzar un objetivo"

Los requerimientos pueden ser:

- Funcionales.
  Definen funciones que el sistema será capaz de hacer, así como las declaraciones de los servicios.
- No funcionales.
  Caracteristicas que puedan limitar al sistema de alguna forma como la interfáz de usuario, seguridad, etcétera.

Modelos de Requisitos

El modelo de requisitos:

- Tiene como objetivo delimitar el sistema y capturar la funcionalidad que ofrecerá desde la perspectiva del usuario.

- Es la base para formar los demás modelos en el desarrollo del software.

Las partes interesadas

- El usuario – la persona que manipula o utiliza el sistema de información
- El cliente – la persona dueña de la empresa o el jefe del área
- El equipo de desarrollo – grupo de personas involucradas en el proceso de desarrollo del sistema de información

Educción de Requisitos

- La elaboración de software de calidad exige que los requisitos de los interesados en la aplicación se recopilen, procesen y conviertan en buenas especificación.

- La educción de requisitos, como se conoce este conjunto de procesos, es una de las tareas más importantes del desarrollo de software.

Educción de Requisitos

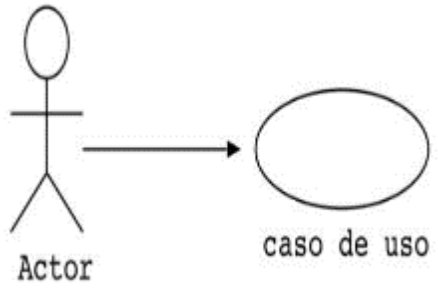
- El análisis de requisitos siempre comienza con una comunicación entre dos o más partes

- Antes de mantener las reuniones con los clientes y usuarios e identificar los requisitos es fundamental conocer el dominio del problema. Enfrentarse a un desarrollo sin conocer las características principales ni el vocabulario propio de su dominio suele provocar que el producto final no sea el esperado por clientes ni usuarios.

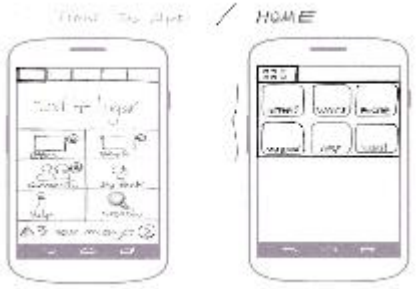
Técnica de Educción de Requisitos

Entrevistas

Brainstorming o tormenta de ideas



Casos de Uso



Prototipado

Observación y análisis de tareas

Técnica de Educción de Requisitos

Las **entrevistas** son la técnica de Educción más utilizada y de hecho son prácticamente inevitables en cualquier desarrollo. En las entrevistas se pueden identificar claramente tres fases: preparación, realización y análisis

Preparación

- Estudiar el dominio del problema
- Seleccionar a las personas a las que se va a entrevistar
- Determinar el objetivo y contenido de las entrevistas
- Planificar las entrevistas

Realización

- Apertura
- Desarrollo
- Terminación

- Tiempo entre 45min a 1 hora

Análisis

- Leer
- Organizar
- Confirmar
- Evaluar

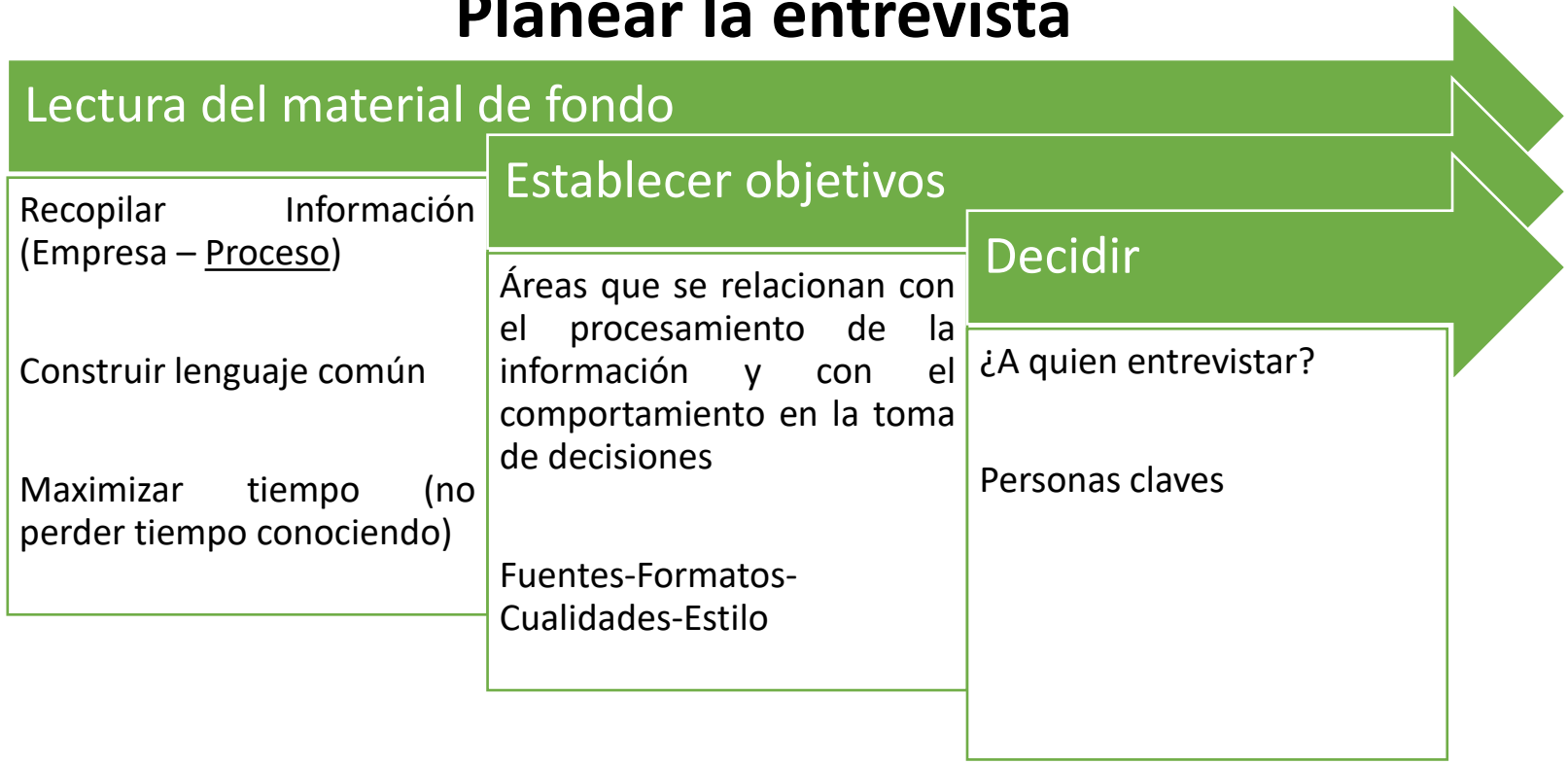
Técnica de Educción de Requisitos

- Una **entrevista** para recopilación de información es una conversación dirigida con un propósito específico se puede utilizar un formato de preguntas y respuestas.

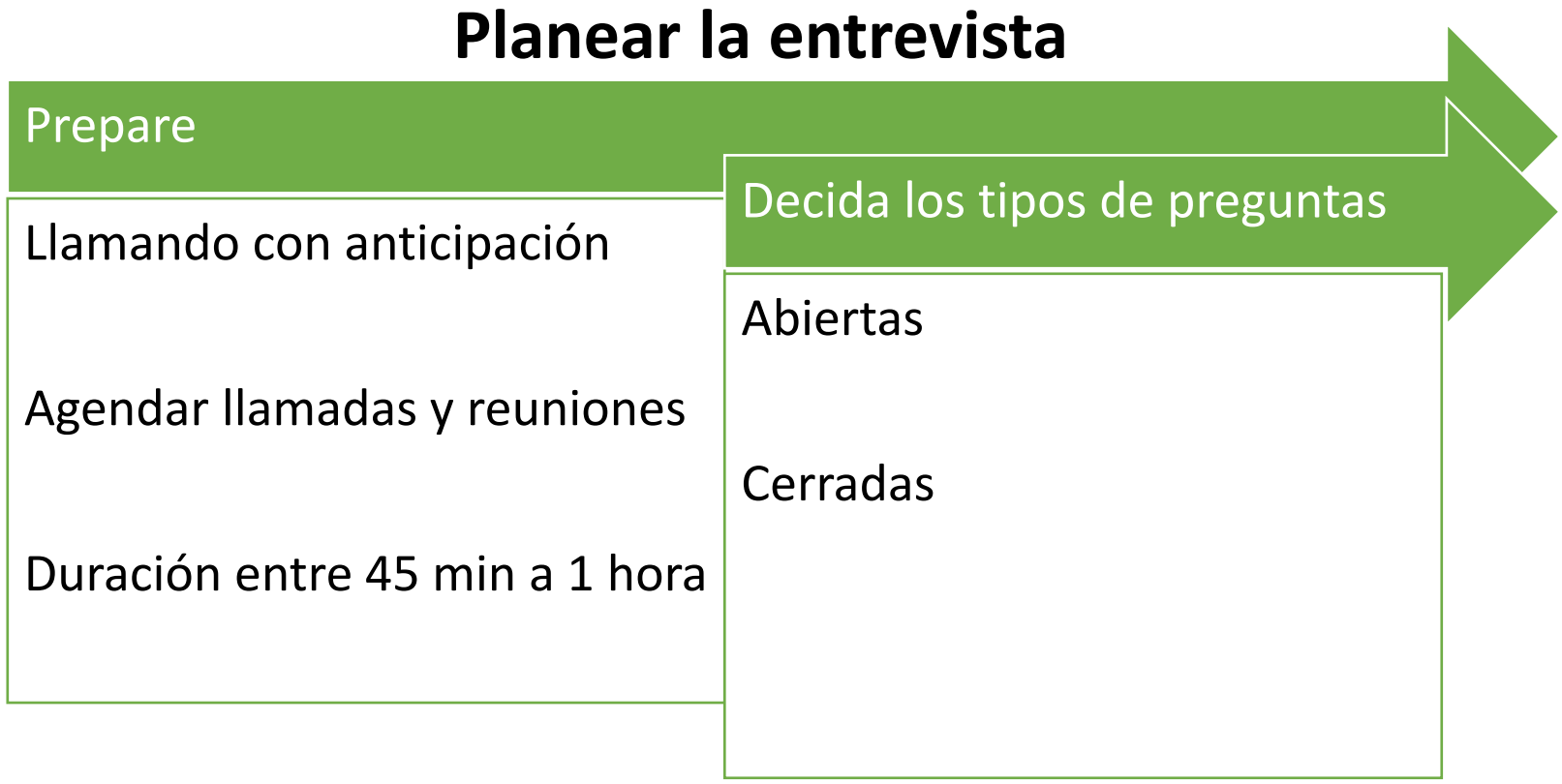
- ¿Qué se busca del entrevistado?
  - Su opinión
  - Sus sentimientos acerca del estado actual del sistema
  - Los objetivos de la organización
  - Procedimientos informales

Técnica de Educción de Requisitos

Planear la entrevista



Educción de Requisitos



Educción de Requisitos
Entrevista – Contexto Software

Table 1. Structure of the interview for the topic "Software context" (part 1/5)

TOPIC		
SOFTWARE CONTEXT		
In this section, we aim to identify the main features of the orgauization: the organizational mission, vision, and goals. Also, we try to identify any problem areas, their features and terminology. Finally, we need to identify the several stakeholders interested in the solution, and the roles they play inside the organization.		
SUBJECT	**GOALS**	**QUESTIONS**
Organizational features		
This subject is addressed by the identification of the main organizational features, the general goals, the specific goals, and other items considered being goals.	-Knowing the name of the organization. -Knowing the economic activity of the organization. -Knowing the mission of the organization. -Knowing the vision of the organization. -Knowing the years of experience the organization has.	-What is the name of the organization? -What is the economic activity of the organization? -What is the mission of the organization? -What is the vision of the organization? -How many years of experience does the organization have in the market?
	-Knowing goals of the organization.	-What is the general goal of the organization? -What are the specific goals of the organization?
	-Knowing the number and name of the departments in which the organization is divided. -Establishing whether the organization has branches. -Establishing the geographical location of the organization (*e.g.*, local, state, and/or national). -Identifying the internal structure of the organization. -Knowing the organizational chart.	-How many departments or areas does your organization have? -What are the departments or areas you have in your organization? -How many branches does your organization have? -What is the geographical distribution of such branches (on the local, state, and/or national level)? -How are your employees organized hierarchically?

Educción de Requisitos
Entrevista – Contexto Software

Table 1. Structure of the interview for the topic "Software context" (part 2/5)

TOPIC		
SOFTWARE CONTEXT		
SUBJECT	**GOALS**	**QUESTIONS**
Organizational features		
	-Knowing the number of employees the organization has. -Knowing the number of employees per branch. -Knowing the number of employees per department (area).	-How many employees do you have in the organization? -How many employees do you have in each branch of the organization? -How many employees do you have in each department (area) of the organization?
	-Identifying the services offered by the organization. -Knowing the kind of users who request the services offered by the organization. -Knowing the services offered for every client. -Knowing the available means for completing the requested services.	-What are the services offered by the organization? -Who are your clients? -What are the services you offer to each client? -What are the means your clients use for requesting services?
	-Identifying the official colors of the organization. -Identifying the organizational logo.	-What are the official colors of the organization? -What is the organizational logo?

Educción de Requisitos
Entrevista – Contexto Software

Table 1. Structure of the interview for the topic "Software context" (part 3/5)

TOPIC		
SOFTWARE CONTEXT		
SUBJECT	**GOALS**	**QUESTIONS**
Problem Area		
This subject is addressed by means of the definition, the features, and the goals belonging to the problem area.	-Identifying a certain problem area. -Defining the general goals linked to the problem area. -Defining the general responsibilities linked to the problem area. -Identifying the employees' role inside the problem area. -Knowing how employees are hierarchically organized inside the problem area.	-Which of the organizational area(s) has/have been showing problems? -What are the general goals of this area? -What are the general responsibilities linked to this area? -What are the employees' roles inside the problem area? -How are the employees organized (hierarchically) in this area?
	-Identifying the responsibilities of the several actors of the problem area.	-What are the main responsibilities belonging to each actor of the problem area?
Actors		
This subject is addressed in order to identify the actors of the problem area and the responsibilities assigned to each one.	-Identifying the kind of users belonging to the problem area.	-Who are the actors belonging to the problem area?
	-Identifying the tasks belonging to every kind of user inside the problem area.	-What are the responsibilities assigned to each one of the actors belonging to the problem area?

Educción de Requisitos
Entrevista – Contexto Software

Table 1. Structure of the interview for the topic "Software context" (part 4/5)

TOPIC		
SOFTWARE CONTEXT		
SUBJECT	**GOALS**	**QUESTIONS**
Problems		
This subject is addressed in order to identify the problems that may arise inside the organization, their root causes, and consequences.	-Knowing the problems that may arise inside the organization.	-What problems are arising inside the organization?
	-Knowing the root causes of each problem.	-For each problem, what are the causes triggering it?
	-Knowing the incidence of each problem on the responsibilities linked to the problem area. -Knowing the consequences of each problem on the way the organization supplies services. -Identifying the goals that have not been accomplished due to problems arising inside the organization.	-What is the incidence of each problem on the responsibilities linked to the problem area? -What are the consequences of each problem on the way in which the organization supplies services? -What are the goals that have not been accomplished due to the problems arising inside the organization?
Stakeholder expectations		
	-Knowing the changes the stakeholder wants to achieve in the organization when the problems are solved.	-Once the solution is being carried out, what are the changes you would like to achieve inside the organization?

Educción de Requisitos
Entrevista – Contexto Software

Table 1. Structure of the interview for the topic "Software context" (part 5/5)

TOPIC		
SOFTWARE CONTEXT		
SUBJECT	**GOALS**	**QUESTIONS**
Problem area terminology		
This subject is addressed in order to identify and define the main terms used in the problem area.	From the information gathered up until now, list the terms most used inside the problem area.	
	For each term belonging to the problem area (and listed by the stakeholder) ask the questions listed in the right-hand column:	
	-Defining the meaning of each term used in the problem area.	-Would you please tell me the meaning of the term (fill each term here) inside the problem area?
	-Identifying the alternative name the stakeholders assign to each term.	-In order to mention the term (fill each term here), is there some alternative name?

Table 2. Structure of the interview for the topic "Problem analysis" (part 1/7)

TOPIC		
PROBLEM ANALYSIS (AND PROCESSES)		
In this section, we aim to identify the processes which are followed in the organization, in order to guarantee the realization of the service; to identify who is responsible, the goals, and associated problems; to identify (for each process) the duration, the frequency, the inputs, the outputs, the constraints, and the implications.		
SUBJECT	**GOAL**	**QUESTION**
Description		
This subject is addressed in order to identify each one of the processes followed inside the organization.	-Knowing the processes followed in the organization for guaranteeing the service realization.	-For each service offered by the organization, what is the process followed?

Educción de Requisitos
Entrevista - Proceso

Table 2. Structure of the interview for the topic "Problem analysis" (part 1/7)

TOPIC		
PROBLEM ANALYSIS (AND PROCESSES)		
In this section, we aim to identify the processes which are followed in the organization, in order to guarantee the realization of the service; to identify who is responsible, the goals, and associated problems; to identify (for each process) the duration, the frequency, the inputs, the outputs, the constraints, and the implications.		
SUBJECT	**GOAL**	**QUESTION**
Description		
This subject is addressed in order to identify each one of the processes followed inside the organization.	-Knowing the processes followed in the organization for guaranteeing the service realization.	-For each service offered by the organization, what is the process followed?

Educción de Requisitos
Entrevista - Proceso

Table 2. Structure of the interview for the topic "Problem analysis" (part 2/7)

TOPIC		
PROBLEM ANALYSIS (AND PROCESSES)		
SUBJECT	**GOAL**	**QUESTION**
For each process listed by the stakeholder, please ask the following questions:		
Process responsible (actor)		
This subject is addressed in order to identify the person responsible for carrying out each one of the processes.	-Identifying the person responsible for following the process.	-Who is responsible for following the (fill in each process here) process?
Process goal		
This subject is addressed in order to identify the goals accomplished by executing every step of the process.	-Listing the intended organizational goals which are accomplished by following the process.	-What are the goals intended to be accomplished by the organization when following the process?
	-Listing the goals accomplished by means of following the process.	-What are the goals already accomplished by means of following the process?
Process problems		
This subject is addressed in order to identify the problems related to following each one of the processes.	-Identifying the problems of the area related to the process followed.	-What are the problems of the area related to the (fill in the process here) process followed?
Process duration		
This subject is addressed in order to know the duration of following each one of the processes.	-Knowing the time needed for following the process.	-How long does it take to follow the (fill in the process here) process?

Educción de Requisitos
Entrevista - Proceso

Table 2. Structure of the interview for the topic "Problem analysis" (part 3/7)

TOPIC		
PROBLEM ANALYSIS (AND PROCESSES)		
SUBJECT	**GOAL**	**QUESTION**
For each process listed by the stakeholder, please ask the following questions:		
Process frequency		
This subject is addressed in order to know the frequency in which the processes are followed.	-Knowing the frequency in which each process is followed.	-How often is the (fill in the process here) process followed?
Events		
This subject is addressed in order to identify the events that trigger the processes.	-Knowing the actions that trigger the processes.	-What actions are made before the beginning of the (fill in the process here) process?
Forms		
This subject is intended to identify the forms linked to each one of the processes, the way in which they are filled out, the person responsible for filling them out, the data included in them, and the mediums in which they are saved.	-Identifying the forms needed for following the processes. -Knowing the name of the form used for following the processes. -Knowing the way in which the form is filled out. -Identifying the actor in charge of filling out the form. -Knowing the data included in the form. -Discovering the relationships between the data to be filled out and the data belonging to other processes.	-Is there some form to be filled out in order to follow the (fill in the process here) process? -What is the name of the form? -What is the way in which the form is filled out (by paper, by web page, by phone, etc.)? -Who is in charge for filling out the form? -What are the data needed for filling out the form? -What are the processes in which the information found on the form is needed? -What is the mediums in which the form is saved? -What are the additional documents needed for filling out the form?

Educción de Requisitos
Entrevista - Proceso

Table 2. Structure of the interview for the topic "Problem analysis" (part 4/7)

TOPIC		
PROBLEM ANALYSIS (AND PROCESSES)		
SUBJECT	**GOAL**	**QUESTION**
For each process listed by the stakeholder, please ask the following questions:		
Forms		
	-Being familiar with the mediums used for saving the information belonging to the form. -Knowing the relationships between the form and other documents involved with the process.	
	If some information is needed from the additional documents:	
	-Identifying the information required by the additional documents.	-What information is needed to register the additional documents in the (fill in the process here) process?
Process inputs		
This subject is addressed in order to identify the inputs needed at the beginning of each one of the processes, the origin of the inputs, the way in which they are processed, the constraints, and controls applied to them.	-Knowing the inputs needed at the beginning of the process.	-What are the inputs needed at the beginning of the (fill in the process here) process?
	-Identifying the sources of the inputs needed at the beginning of the process.	-Where are the sources of the inputs needed at the beginning of the (fill in the process here) process?
	-Knowing the way in which the inputs are processed.	-What has to be done to the inputs in order to obtain the outputs of the (fill in the process here) process?
	-Knowing the constraints and controls applied to the inputs.	-Is there any control or constraint to be applied to the inputs of the (fill in the process here) process?

Educción de Requisitos
Entrevista - Proceso

Table 2. Structure of the interview for the topic "Problem analysis" (part 5/7)

TOPIC		
PROBLEM ANALYSIS (AND PROCESSES)		
SUBJECT	**GOAL**	**QUESTION**
For each process listed by the stakeholder, please ask the following questions:		
Process outputs		
This subject is addressed in order to identify the outputs from each one of the processes, the output format, the destination of the outputs, and the constraints and controls applied to them.	-Knowing the outputs from the processes.	-What are the outputs generated by following the (fill in the process here) process?
	-Knowing the format used to show the outputs from the processes.	-What is the format used to show the outputs from the (fill in the process here) process?
	-Knowing the destination of the outputs generated by a process.	-What is the destination of the outputs generated by the (fill in the process here) process?
	-Knowing the controls and constraints applied to the outputs of a process.	-What are the controls and constraints to be applied to the outputs of the (fill in the process here) process?
Reports		
This subject is addressed in order to identify the documents or reports associated with the outputs of a process, the name of the document, the data inside the document, and the destination of the document.	If the output from a process is a document, ask the following questions:	
	-Identifying the name of the document.	-What is the name of the document?
	-Identifying the data shown in the document.	-What data items appear in the document?
	-Identifying the things can be done with the document.	-What things can be done with this document (printing, saving, e-mailing, using it in another process, etc.)?

Educción de Requisitos
Entrevista - Proceso

Table 2. Structure of the interview for the topic "Problem analysis" (part 6/7)

TOPIC		
PROBLEM ANALYSIS (AND PROCESSES)		
SUBJECT	**GOAL**	**QUESTION**
For each process listed by the stakeholder, please ask the following questions:		
Location for following the process		
This subject is addressed in order to identify the place in which the processes are followed.	-Identifying the location for following the processes.	Where is the (fill in the process here) process followed?
	If the process is automated or guided by a software tool, ask the following questions:	
	-Identifying the software tools used for following the process.	What are the software tools needed for following the (fill in the process here) process?
	-Knowing the version of the software tool.	-What is the version of the software tool?
Business rules applied to the process		
This subject is addressed in order to identify the business rules associated with each one of the processes.	Knowing the business rules for following the processes.	-What are the business rules for following the (fill in the process here) process?
Pre-conditions		
This subject is addressed in order to identify the pre-conditions associated with each one of the processes.	-Knowing the status of the system needed for beginning the processes.	-What status of the system is needed for starting the (fill in the process here) process?
	-Knowing the requirements for beginning the processes.	-What are the requirements needed at the beginning of the (fill in the process here) process?
Post-conditions		
This subject is addressed in order to identify the post-conditions associated with each one of the processes.	-Knowing the status of the system to be reached after having followed the process.	-What is the status of the system after having followed the (fill in the process here) process?

Educción de Requisitos
Entrevista - Proceso

Table 2. Structure of the interview for the topic "Problem analysis" (part 7/7)

TOPIC		
PROBLEM ANALYSIS (AND PROCESSES)		
SUBJECT	**GOAL**	**QUESTION**
For each process listed by the stakeholder, please ask the following questions:		
Storable features		
This subject is addressed in order to identify the information which requires storage.	-Knowing the inputs which require storage. -Knowing the outputs which require storage.	-What input data need storage? -What output data need storage?
	-Knowing the features of the data which require storage. -Knowing the mandatory data.	-What are the features of such data? -Which of such data is mandatory?

Table 3. Structure of the interview for the topic "Functional Requirements validation" (part 1/3)

TOPIC
FUNCTIONAL REQUIREMENTS VALIDATION
FUNCTIONAL REQUIREMENTS
In this section, we aim to validate the functional requirements, its specs, the inputs, the process involved, and the outputs.
For each one of the functional requirements analyzed from the information gathered in Tables 2 and 3, we should define the information listed below which is related to each issue to cover. Such information is useful for validating all the functional requirements in order to develop their correct, complete, and consistent specification.
Functional requirement N°

Referencias

- Anabalón, J. R. (2005). Las Causas más Comunes de Falla en la implantación de Mejoras en Software. *Universidad de Santiago de Chile., Departamento de Ingeniería Informática*.
- Jacobson, I., Ng, P. W., McMah, P. E., & Jaramillo, C. M. Z. (2013). La esencia de la ingeniería de software: El núcleo de Semat. *Revista Latinoamericana de Ingeniería de Software*, *1*(3), 71-78.
- Manies, M., & Nikual, U. (2011). La elicitación de requisitos en el contexto de un proyecto software. *Revista Ingenierias USBMed*, *2*(2), 25-29.
- MoProSoft: modelo de procesos de software hecho en México. 2006; 47: [Available from: http://www.enterate.unam.mx/Articulos/2006 /marzo/moprosoft.htm
- Zapata, C. M., & Carmona, N. (2010). Un modelo de diálogo para la educción de requisitos de software. *Dyna*, *77*(164), 209-219.
- Zapata, C. M. (2012). The UNC-Method revisited: elements of the new approach
- Weber, K., et al., Mejora de Proceso del Software Brasileño (MPS.BR): un Programa de Movilización, 2006. 8. Miranda, M.T.V. and M.P. Báez.
- Westfall, L. (2011). Las fallas en la ingeniería de requisitos. *Ingenierías USBmed*, *2*(2), 40-47.