BPMN Modeling for the establishment of a workflow of Internal Audit Plan according to the Quality Management System

Zied BEN RHOUMA
Younes BOUJELBENE

Abstract:

The success of an internal audit mission of the Quality Management system depends mainly on compliance with its schedule established beforehand by the internal auditor.
This article consists in building a modeling of BPMN scenarios aiming at the elaboration of an Internal Audit plan and resulting in a Workflow development capable of primarily automating an Audit plan according to the availability of the auditees, and in accordance with the requirements of the System. of Quality Management.
The workflow in coalition between the communication process and that of the Internal Audit planning meeting a set of requirements to be respected by the International Standard ISO 9001: 2015 and the guideline 19011: 2018, can be an effective solution to solve the problem of complexity in the development of internal audit plans within large organizations.

Key Words:

"BPMN" Business Process Modeling Notation; Communication ; Internal audit planning ; workflow ; Business Process Reengineering

1. Introduction

[1] have found that effective communication is one of the success factors affecting the acceptance of technology in an environment of implementing the integrated management software 'ERP'.
The project of the current paper consists of showing the way in which the author can construct a workflow mechanism ensuring the internal audit program underlining the crucial role of information sharing and communication in establishing an effective audit plan.
The internal audit plan can be passed for review and accepted by the customer of the internal audit. Furthermore, it needs to be presented to the person audited. Every objection needs to be resolved, removed by the audited, between the responsible of the audit team, the audited and the audit customer. [2]
In fact, the interpersonal communication and the internal audit program are two operational processes that their fusion can result in an improved workflow in coalition in order to resolve on the one hand the problem of complexity relative to the establishment of the internal audit plan for the companies with important sizes and meeting the requirements of two standards [3] via information sharing and feedback on the other hand.

2. Literature Review:

[5] stresses the cooperative nature of communication when it is used to coordinate actions. To communicate well is then a necessary condition to the success of a company, however it is not enough. Because communication, is also and above all about establishing harmonious working relationships between persons forming the company.
The literature of business process redesign provides abundant techniques and methods for the calculation of needs/requirements relative to users to automate processes. [6]
Without proper management, particularly for the analysis of audit findings, the internal audit process can be an ineffective use of resources.
A Workflow system 'WFS' enables to clarify the responsibilities and communication networks between departments of the decision-making process, allowing decision-makers to better benefit from the advantages of increased automation. [7]
Internal audit program procedures are the first and perhaps the most important step in carrying

out a successful audit. Without adequate program, the likelihood of missing a significant risk area or encountering engagement-related problems increases considerably. [8]

The internal audit program represents the information system complying with audit objectives required by the customer in compliance with Professional Standards and Laws. [9]

It is recommended that the internal audit plan must be flexible enough to allow for modifications that can seem necessary to measure the location where audit activities will be performed. [10]

The process of validation of the internal audit plan by the auditees following its development differs according to the size of the company and the number of audited

On the operational level, the planning of the Internal audit requires interpersonal communication in order to respect the scheduling of the audit program, based on the different activities of the processes to be audited which are defined by the auditor on his audit program.

Information sharing is certainly a form of communication to adjust the continuity of the internal audit program with the availability of people to audit.

3. Research Methodology:

To establish this work, we have adopted the ASDIM methodology (Analysis, specification, Deployment, Implementation, Monitoring) recommended by in 1991.[11]

3.1 ASDIM Methodology:

- In the step of "Analysis", we will study the requirements of the International Quality Management Standard ISO 9001:2015 2015 in relation to the internal audit planning and communication between auditor and auditee.

- The step of "Specification" will be reserved for:
  - ✓ The designation of responsibilities for each of the steps in accordance with the BPMN model, as well as the conceptual model **(Annex 5: Model 3).**
  - ✓ Master the planning of carrying out the tasks of the different responsibilities.
- The step of Deployment processes the design. We exploit all screenshots extracted from computer development by describing its interfaces and their uses.
- The step of "Implementation" is concerned with checking the hypothesis mentioned during the stage of analysis, presenting results and discussing them.

4. Context of the problematic and development of the present research:

Step1: Analysis

4.1 Context of the problematic:

The Research of [12] has shown that according to professional standards, analytical procedures should be used in the planning phase to help plan the nature, timing and extent of audit procedures.

Priorities in the risk universe align the audit plan directly with strategic objectives and material risks that affect the achievement of the entity's objectives.

The process of internal audit program is becoming more and more complex in terms of the size of and number of audited persons within the company the fact that requires centralization of information flow through communication for validating the internal audit plan.

Planning internal audit by prioritizing the units to be audit is critical in terms of effective use of available audit and financial resources. In this paper, a new Elimination and Choice Translating Reality (ELECTRE) based decision support model is developed for addressing an internal audit prioritization problem. [13]

The requirements of ISO 9001: 2015 standard in terms of communication and internal audit program must be respected. In fact, the requirement 7.4. related to 'Communication' states that the organization shall determine the internal and external communications relevant to the quality management system including: a) on what it will communicate; b) when to communicate; c) with whom to communicate; d) how to communicate; e) and who communicates.

The requirement 9.2.2 also mentions that the organization shall: a) plan, establish, implement and maintain an internal audit program (s) including the frequency, methods, responsibilities, program requirements and reporting, which shall take into consideration the importance of the processes concerned, changes affecting the organization, and the results of previous audits.

The requirement 5.4 of the international standard NF EN ISO 19011 (Guidelines for auditing management systems) mentioned that

the responsible for the audit team prepares a plan based upon the information comprised at the level of the internal audit program as well as the documentation provided by the audited. The degree of details and the content of the internal audit plan can, for example, be different among the initial and ultimate audits and equally among the internal and external audits.
Additional requirements of ISO 9001: 2015 **(Annex 1: Table 1)**, and the Guideline for audits of management systems ISO 19011: 2018 **(Annex 2: Table 2)** have been developed for the different BPMN modeling.
Management with workflows has been adopted as a basic technology to manage complex and long-term application processes in several areas.

4.2 Hypothesis of the present research:

The internal audit program mission requires an exceptional aptitude effectively communicated. [14]
Adaptive decision-making requires that feedback about decision outcomes is adequately processed.
The mechanism of Workflow coalition adopted in this article is to solve the problem of complexity of the development of the internal audit plan especially in large structures where the process of its validation remains complicated which allows us to announce the next hypothesis:

Modeling a BPMN process based on the requirements of the International Standard ISO 9001:2015 and the Guideline 19011:2018 allows the construction of a Workflow in coalition (Communication and Internal Audit planning) solving the problem of complexity of the development of a priority Internal Audit plan.

4.3 Conceptual model of the research hypothesis:

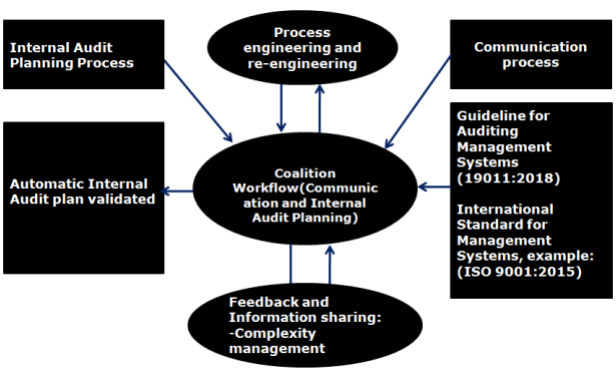

Figure.1. Conceptual Model

5. BPMN' Modeling and Merger by 'BPR'

Step 2 : Specification

5.1 BPM:

Widely known in English under the name of « Business Process Reengineering », 'BPR' is an approach aiming at rethinking, in a creative and innovative way company fundamentals, its way of operation as well as the different technological tools used.|[15]

BPMN Modeling Specification:
The 'BPMN' Business Process Modeling Notation Specification describes a standard business process modeling notation [16].
This management standard aims to provide an explicit, visual and accessible rating for all company stakeholders. In a more ambitious way, 'BPMN' wishes to be a standard for the design of information systems.
Although the 'BPMN' notation is intended for business analysts, it considers the paradox that exists between the need to model a business process and its execution in a process management system.
BPMN analyzes a business process as a set of related activities emphasizing the functional perspective of the process.
Indeed, business processes are performed among independent partners while crossing organizational boundaries.[17]
The aim of the work of [18] is to enhance TLR approaches in BPMN models by incorporating the linguistic particularities of BPMN models into the TLR process.
The research work of this article aims to improve process specifications using 'BPMN'.IT development interfaces related to the internal audit program have been modified to integrate internal audit program (**Annex 3: Model 1**) with the communication process. (**Annex 4: Model 2**)

6. Results of BPMN Modeling of Skills Management:

Step 3: Deployment

Audit planning requires the alignment of business processes with strategies that facilitate the interaction between the auditor and the auditee in validating the internal audit plan.
This was the subject of automated communication by Workflows as an effective solution for sharing information to be validated.
In fact the requirement 7.4 of communication relative to the ISO 9001 :2015 standard is respected in terms of the way to communicate, time of response, the person with whom to

communicate as well as the definition of the responsibility of the sender, receiver and decision if necessary.

The ISO 9001:2015 standard according to its requirement 9.2.2/a, postulates that the organization must plan and provide for the reports to take into account the importance of the internal audit planning processes, changes having an impact on the organization as well as the results of previous audits

Based upon Business Process re-engineering 'BPR', our research paper has enabled us to develop through workflows a 'feedback' via a potential fusion between the two processes of communication and program of audit with the possibility to give birth to a workflow coalition permitting to resolve the problem of complexity and of internal audit program even though the higher number of steps of the improved process.
The merger of the internal audit planning and communication processes has resulted in a new automated version equipped with a workflow technology modeled in 'BPMN'. **(Annex 5: Model 3)**
The modeling of the different processes was carried out by the Modelio Open Source 3.6 software.

7. Deployment of computer development results:
Step 4:Implementation

The workflow system enables a feedback assisting us in decision-making using colors to better facilitate its usage.
A feedback with an orange color representing a signal for the auditor to replan the audit in compliance with what has been decided in the correspondence of Workflow communication. This verifies the requirement 7.4 of communication relative to the ISO 9001:2015 standard applicable to the internal audit program so as to precize the responsibilities of the sender (Auditee) and the receiver (Auditor and responsible for decision at the same time) as well as the deadlines to be validated following the modification decision subject of communication between the auditor and the auditee.
Let's take the Audit Planning scenario discussed by the author in this article. The audit planning phase makes it possible to select all the departments visited by the staff to be integrated before completing the internal audit schedule.

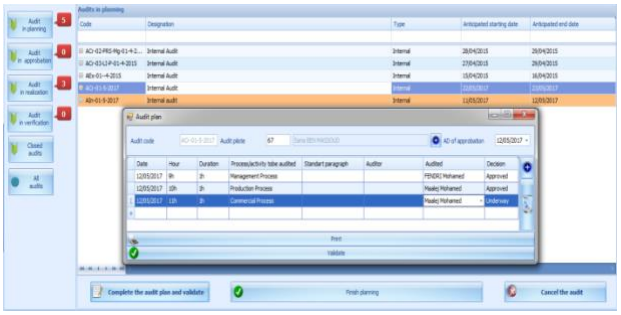

Figure.2. Interface «Audits in program » extract from computer development

From the stage of « Validation of the audit plan », the audited will immediately launch an update of the date and hour already planned for the internal audit.
Through pressing the button «Demand of update», a communication process in Workflow is launched automatically in liaison with the Program Workflow of internal audit. If the audit plan is validated or approved, the stage of audit realization can be launched.
Once the update request is launched, an interface entitled « internal communication» is displayed to perform a set of choices (the communication topic, the sender, the receiver, the responsible for decision, the means, limit dates of response and decision and the description in addition to the possibility to attach files). A communication between the audited (Sender of this communication) and the auditor (Receiver and decision-maker of this communication).

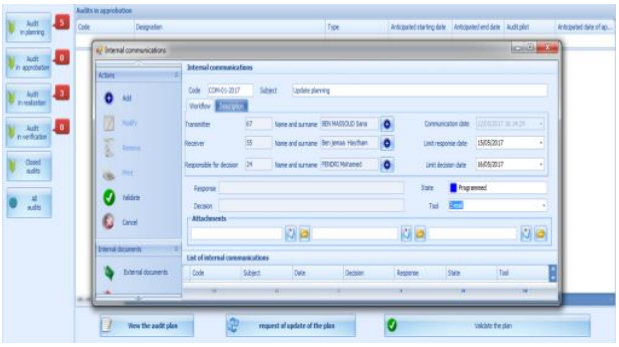

Figure.3. Interface «Internal communications» extract from IT development as part of internal audit approval

When receiving the communication, the receiver (Planner of internal audit) must validate the anticipated date before writing his response in order to make the appropriate decision about the change of validation subject of the reception of the communication or its cancellation.

Now regardless of the size of the company, the internal audit plan will be validated by the auditees through effective communication with feedback capable of solving the problem of complexity of its development.

8. Conclusion

Finally, through the current paper, the author suggests a support of perfection for an organization that wishes to meet standard requirements of the ISO 19011 and ISO 9001. Our work consists of constructing a quality-driven Workflow mechanism capable of improving the dimensions of time, responsibility and reliability to valorize in advance the processes of internal audit program and its perfect interaction with the communication process.

The automation in IT development of two correlated Workflows has enabled us to resolve the problem of complexity of establishing the internal audit plan essentially in companies of important sizes.

The information sharing and communication play a major role in establishing an internal audit plan. Future studies can revolve around concrete examples of business processes of management systems as well as the way they are deployed via 'IS' that are endowed with a Workflow technology.

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Annexes

Annex.1

Table 1: The ISO 9001: 2015 Requirements for the Internal Audit program process

Chapter of the standard	Requirements of the ISO 9001: 2015 in relation to Internal Audit Program	
5 – Leadership	**5.3**	Top management shall ensure that the responsibilities and authorities are assigned, communicated and understood.
6 – Program	**6.3**	When the organization determines the need for changes to the quality management system, the changes shall be carried out in a planned manner. The organization shall consider: a) the purpose of the changes and their potential consequences;
7 – Support	**7.4**	The organization shall determine the internal and external communications relevant to the quality management system, including: a) on what it will communicate; b) when to communicate; c) with whom to communicate; d) how to communicate; e) Who communicates.
	7.5.3	Control of documented information.
9- performance Evaluation	**9.2.2**	The organization shall: a) plan, establish, implement and maintain an audit programme(s) including the frequency, methods, responsibilities, program requirements and reporting, which shall take into consideration the importance of the processes concerned, changes affecting the organization, and the results of previous audits;

Source: International Standard ISO 9001 Fifth edition of 15-09-2015. Quality Management System-Requirements

Annex 2:

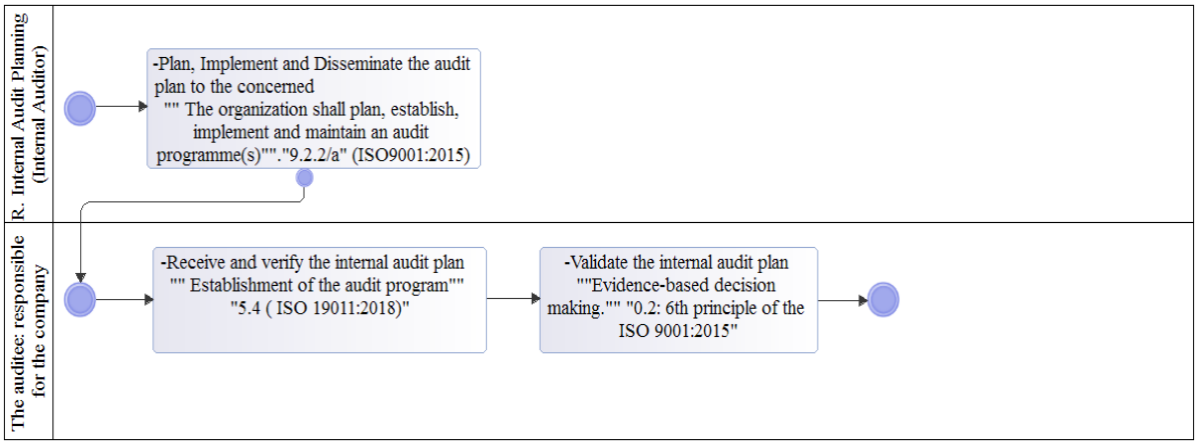
Table 2: Guidelines for auditing management systems ISO 19011:2018 in relation to Internal Audit Program

Chapter of the standard	**Guidelines for auditing management systems ISO 19011 :2018 in relation to Internal Audit Program**	
5 –Managing an audit programme	**5.4.3**	The person (s) responsible for the management of the audit program should determine the scope of the audit program. This may vary depending on the information provided by the auditee regarding its context
	5.7	The person (s) responsible for the management of the audit program should review the overall implementation of the audit program, and the changes to the audit program, if necessary.
	5.4	Establishing the audit programme

Source: International Standard ISO 9001 Fifth edition of 15-09-2015. Quality Management System-Requirements

Annex 3:

Model 1. Internal Audit Program Process Modeling



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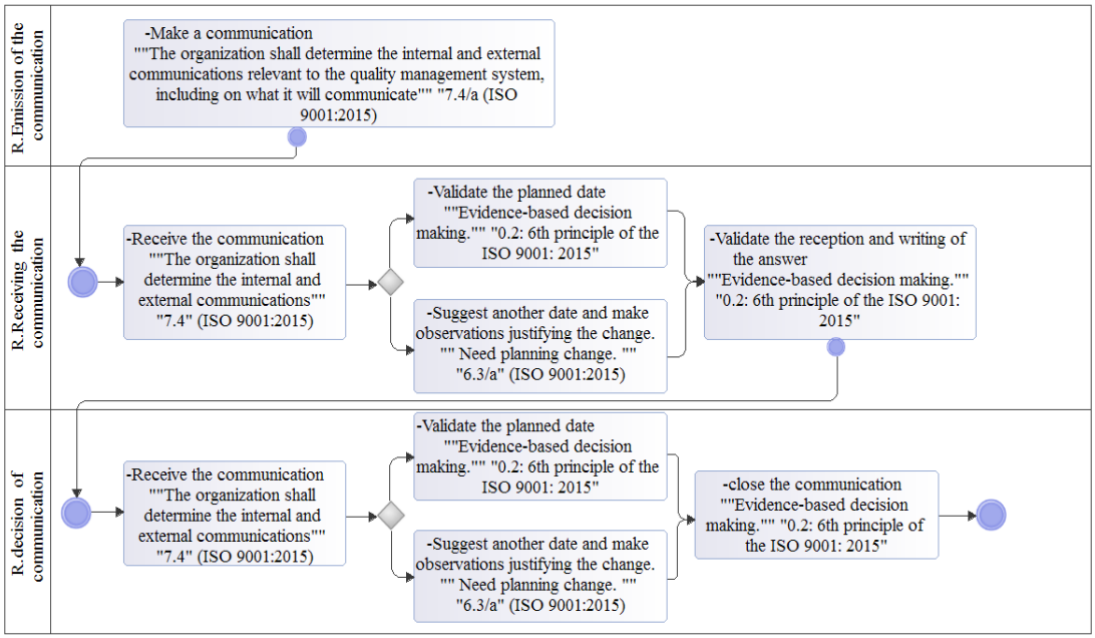
Annex 4:

Model 2. Modeling the Communication Process



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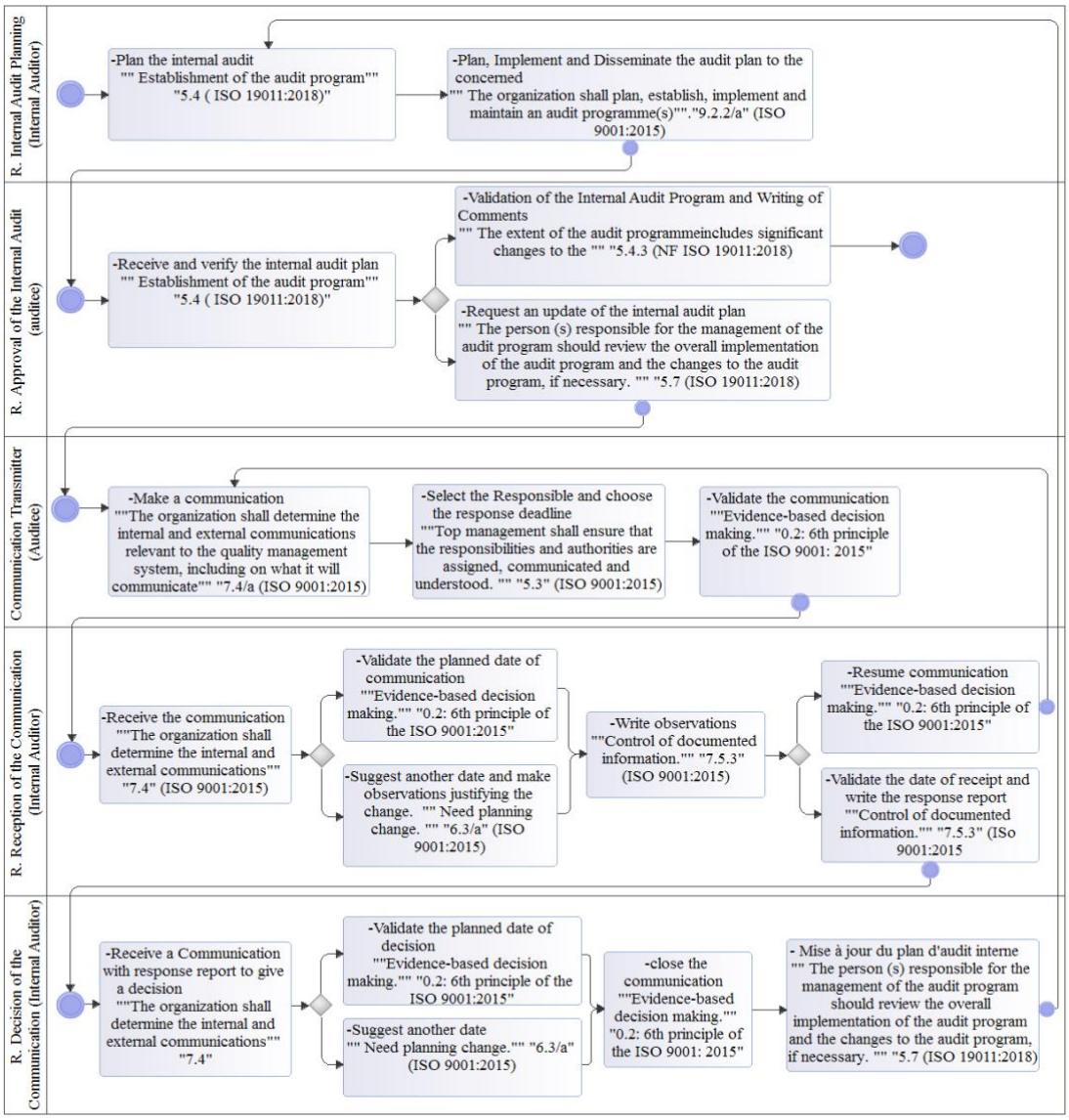
Annex 5:

Model 3. BPMN Coalition Workflow: Internal Audit and Communication Program



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