Towards Auditors' Preferences on Documentation Formats in Business Process Audits

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Abstract: Internal and external auditors play an increasingly important role for building up trust and confidence in today's economic cycle. To ensure effective and efficient audits, current audit standards demand from auditors to gain an in-depth understanding of the clients' business processes. In this context, seminal research results indicate that type and number of documentation formats have a significant impact on audit effectiveness and efficiency. However, audit standards do not define type and number of documentation formats and little research attention has been paid to this selection problem with regard to a process modeling support for auditors. To close this gap, we conducted an online survey among auditors with expertise in process auditing. With the answers of 370 participants we derive prevalent preferences on type and number of documentation formats for particular audit concepts and analyze factors influencing the format decision. The results provide a useful basis for developing a domain specific modeling language for process audits which is currently lacking.

1 Introduction

The enactment of the Sarbanes-Oxley Act in 2002 (SOx) and subsequent SOx-type laws in several countries around the world sets a strong focus in the audit domain on the internal controls system (ICS) an organization has to implement in its business processes in order to ensure compliance to active legislation. In current audit practice the clients' business processes along with embedded controls are considered as integrated audit object instead of auditing single control means. Therefore, process audits are today one of the central audit procedures for external and internal auditors. In this regard, audit standards demand from auditors to gain an in-depth understanding of the business processes in order to derive a comprehensive audit result for an organization [IAA09]. However, auditing a business process is a complex task as a large amount of information need to be collected, integrated and analyzed. Diverse sources need to be considered affecting several stakeholders on different organizational levels [Ma00]. Nowadays, auditors base their collection and evaluation of relevant information on several fundamentally different documentation formats ranging from flexible, less structured narra-

tives over structured aids like questionnaires or matrices to graphical formats such as flowcharts or organizational charts [BJJ07][Pu89]. In this regard, audit standards do not impose binding requirements for documentation formats although research results indicate that the format of audit relevant information significantly influence auditors' effectiveness and efficiency [BMW09]. However, auditors consider the advantages and disadvantages of different formats. For instance, especially external auditors set their focus on audit efficiency to cope with the increasing competitive pressure. Therefore, they often rely on less time-consuming documentation formats like narratives [BW04]. This, of course, has implications for the audit effectiveness, especially in light of prior research results showing that a more elaborate flowchart representation facilitates the audit of a business process and hereby increases the audit effectiveness [BHT09]. Although audit related issues receive increasing attention in academia and practice in recent years, there is still a lack of methods and corresponding software solutions to comprehensively annotate, analyze, and simulate business processes in the course of business process audits [RWS10] [Sa11]. This is especially surprising in view of the large amount of information to be considered in business process audits and the resulting high cognitive load for auditors. Up to now, no comprehensive research on the most supportive presentation format(s) for audit-relevant information has been conducted in order to reduce this high cognitive load. Initial research in this area indicates that different presentation formats are suitable for different information needed in the course of a process audit [BMW09]. However, the most supportive presentation formats for single audit concepts has not yet been investigated. In this context, an audit concept constitutes information about real world objects needed to conduct a process audit (cf. section 2).

Addressing this gap we conduct an online survey with 370 auditors in order to gain deeper insights into the preferences of external and internal auditors regarding the type and number of documentation formats for particular audit concepts. Moreover, we analyze the actual usage of business process modeling languages (BPML) in the audit domain as flowcharts seem particularly suitable in the context of process audits [BHT09]. These results form a basis for the development of an integrated presentation of relevant information in the course of a business process audit.

The remainder of this paper is structured as follows: the next section gives an overview of the related research work and background information. Section 3 describes the applied research method by providing details on the questionnaire design and the targeted population. Section 4 presents the research results. The paper ends with a conclusion, limitations, and implications for future research work.

2 Background and Related Research

The presentation of information has bothered mankind for more than 40,800 years: first cave paintings were found as early as that [PHG12], ever since different kinds of information had to be presented in one way or another. Thereby, finding the "right" way of presenting information or the best possible presentation format is a difficult task. The audit-relevant information investigated here has been a research object for quite some time. For instance, Pacioli and Paganini first fully described the double-entry bookkeep-

ing in 1523 using T-accounts [PP23]. Audit-related literature from the last century mainly focuses on the support of analytical audit procedures (e.g. risk assessment, financial ratios and relationships) as they were the method of choice at that time. Already in 1979 Moriarity examined a multidimensional graphic technique for describing the financial status of a firm. He shows that schematic faces are useful means for communicating financial information in some cases [Mo79]. Pointing in the same direction with his research, Kaplan examined the effect of presentation formats on values expected by auditors in analytical audit procedures [Ka88]. Another stream of research investigated the effect of audit documentation formats on the amount of data collected in the course of an audit, see for instance [Pu89].

In 1997, the business risk audit approach was introduced by Bell [Be97]. As a result, research focus shifted from documentation formats for analytical audit procedures towards the most supportive presentation formats for the new audit approach [BW04]. One of the results of this research was that after adopting the new audit approach auditors significantly more often use narratives instead of other formats (e.g. questionnaires, matrices). Two reasons coming along with the use of narratives were responsible for this change: first, the perceived improvement of audit efficiency; second, the high flexibility of narratives that fits well to the new audit approach.

The penultimate reform took place with the enactment of the Sarbanes-Oxley Act (Sox) of 2002 [So02]. As one result, the company's ICS gained a central role in the applied audit approaches. Consequentially, researchers focused on the most supportive documentation format for internal controls. Already in 1999, Bierstaker presented a survey on preferred internal control documentation formats and their combinations that auditors commonly use [Bi99]. Results depict that approximately 88 percent of the auditors use narratives, 60 percent questionnaires, 46 percent flowcharts, and 37 percent an internal control matrix as documentation format for their audit assignments. In a next step Bierstaker and Brody examined whether the documentation format affects auditors performance [BB01]. Contrary to their expectation the documentation format did not affect performance. However, the auditing experience had an impact on the performance, regardless of the documentation format used. In contrast to these findings the next investigation on different commonly used formats and the effect of auditors experience revealed that auditors who utilize an internal control questionnaire more likely identify internal control design weaknesses than auditors who prepare a narrative. Therefore, it can be concluded that the use of questionnaires and narratives have an impact on auditors performance in identifying internal control design weaknesses [BT06]. In 2007 Bierstaker et al. examined factors that influence the choice of type and number of different formats for documenting internal controls [BJJ07]. This publication draws a more differentiated picture of the topic as it not only considers the auditor's expertise but also the clients' information technology (IT) complexity and firm size. They found that high IT complexity positively correlates with a higher probability of using flowcharts. Still, auditors most likely use narratives followed by questionnaires.

Just recently a slow shift from the pure internal controls perspective towards a stronger process orientation can be noticed in the audit domain. Again, along with this shift researchers started to analyze ways to support this business process-oriented perspective.

In this field of research a long-discussed representation format for processes are flowcharts respectively flow diagrams. Bradford et al. evaluated the use of diagramming techniques in accounting education and practice [BRR07]. Specially concentrating on internal auditors, Andrews investigated how modeling language diagrams can help to visualize organization's business processes with regard to audit-relevant aspects [An07]. Another study showed that flowcharts increase the auditor's ability to identify missing controls in a business process [BHT09].

However, there have been two factual shortcomings regarding audit-relevant information in the context of a business process audit. First, a comprehensive assessment of which audit concepts should be presented in which presentation format(s) had not been undertaken. As a matter of fact, research predominantly focused on single aspects of the domain, rather than drawing a full picture. Second, up to now all research work has based on requirements that have been derived primarily from reviews of relevant literature, audit standards and frameworks (e.g. [COSO13]). Domain experts or stakeholders have not been comprehensively involved. In order to close this gap, the authors conducted expert interviews [SMN12] and a quantitative online survey by which twelve audit concepts were identified as relevant for a process audit [MSP13]. Table 1 depicts these concepts along with short descriptions that were derived from expert interview statements.

Table 1: Short Description of analyzed Audit Concepts [SMN12]

Concept	Short Description provided in the online survey
Controls	Procedure that aims at preventing/ detecting an undesirable event or result, e.g. manual/ automated, preventative/ detective
Process Flow	Sequence of interdependent or linked activities e.g. purchase-to-pay, warehousing, order-to-cash.
Risks	A threat of an event with negative effects, e.g. system breakdown, misstatement, fraud.
Data	Any type of electronic or paper-based input or output of a process activity, e.g. invoices, vouchers, contracts, reports.
Information Systems	Any combination of information technology and people's activities that support operations, management and decision making, e.g. ERP-Systems
Audit Objectives	Overarching goal of an audit. It can be broken down into more detailed assertions or control objectives, e.g. reliability of financial statements, compliance of a process.
Organization	Any organizational unit, e.g. department, role, employee.
Standards& Regulations	Legislative rules or commonly accepted standards providing requirements/ guidelines for processes or their results, e.g. GAAP, Sox, COSO.
Audit Results	Result of a performed audit. It refers to a process and/ or individual controls and comprises assessments of design and operating effectiveness.
Materiality	"Information is material if its omission or misstatement could influence the economic decisions of users taken on the basis of the financial statements" ISA 320 [IFAC10].
Financial Statements	Reports about an organization's financial results and conditions like balance sheet and income statement.
Business Objectives	A specific result that an organization aims to achieve within a time frame and with available resources, e.g. profit.

As presented before, seminal research work regarding documentation formats in the audit domain could be identified only for a small number of these concepts. One possible explanation for this limitation is that only recently the focus of auditors has been laid on business processes and related audit concepts. Furthermore, the business process audit approach is comparatively new.

3 Research Method

The paper at hand applies a quantitative research method as it collects and analyses data from an online survey focusing on internal and external auditors with expertise in process audits. It complements prior empirical research results regarding audit concepts and their relations in the context of business process audits. These were derived from semi-structured expert interviews [SMN12] and the analysis of the first part of this online survey [MSP13]. This paper deals with the analysis of the second survey part.

Online surveys are a well-established method that is widely used for data collection not only in information systems research [PLM04]. For preparing the questionnaire and conducting the online survey the authors follow the process proposed by Lumsden and Morgan [LM05]. It comprises six steps: 1) define the research question; 2) divide the research question into sub-categories; 3) determine and profile the target audience; 4) design and implement the content; 5) pilot the questionnaire; 6) administer the questionnaire. The following sections describe the activities in each step.

3.1 Research Question and Questionnaire Content

The survey presented here is of descriptive nature. The purpose of a descriptive survey is to find out what situations, events, attitudes or opinions occur in a population [PK93]. In particular, this survey aims at presenting new insights into the audit domain regarding the current usage of BPMLs and existing preferences among auditors for the documentation format of audit relevant concepts in a process audit. This question is divided into three sub-categories: 1) usage of modeling languages; 2) satisfaction with the used BPMLs; and 3) documentation format preferences for audit-relevant concepts.

To each sub-category appropriate questions are assigned and the logical structure of the questionnaire is derived based on the relationships between these sub-categories. The questionnaire starts with an invitation text which explains the nature of the survey, demonstrates third-party trustworthiness, and defines an incentive (a free copy of the research results). Subsequently, personal questions are asked as presenting them at the end of a questionnaire may result in an increased drop-out rate [ANP03] [SFE02]. Table 2 gives a simplified overview of the questionnaire structure.

Table 2: Questionnaire Structure

Part	Topic	Ques.
1	**Respondent's organization, role, work experience**	Q1-Q5
	1. Which sector is your company operating in?	
	2. How many employees work at your company?	
	3. How many employees primarily work in the department for process audits?	
	4. What is your job title?	
	5. How many years of experience do you have in process auditing?	
2	**Usage of process modeling languages**	Q6
	6. Which process modeling language(s) do you currently use to prepare/ depict audit-relevant business processes?	
3	**Satisfaction with the used process modeling language(s)**	Q7
	7. How satisfied are you with the process modeling language(s) you use?	
4	**Documentation format preferences for audit-relevant concepts**	Q8
	8. Which formats should be used to document audit-relevant concepts in the context of a business process audit?	

3.2 Questionnaire Design[1]

In academia a plethora of guidelines exist on the design of questionnaires. These guidelines rest upon a wide range of seminal research work and encompass recommendations for *technical aspects* of the survey implementation, the *design* and *layout* as well as *language-related aspects* [MSB08] [LM05]. As an online survey is self-administered and the authors have no control of the completion, the design of the questionnaire is of vital importance for the quality of the survey data [Be10]. The design of the questionnaire presented here is preponderantly based on the guidelines of Morrison et al. 2008 [MSB08] and Lumsden and Morgan [LM05]. By carefully following these relevant guidelines, the questionnaire contributes to reduce measurement errors (deviation of the answers of respondents from their true values on the measure) and the non-response rate (which leads to non-observation errors as intended measurements cannot be carried out) to a minimum [Co00] [Be10].

To avoid a high non-response or drop-out rate due to technical problems the support of multiple platforms and browsers is crucial for the quality of an online survey [Be10]. The implementation of this questionnaire addresses this aspect by solely utilizing standard HTML and a minimal usage of java script. In order to arrange the completion of the questionnaire as flexible as possible for the respondents, it is possible to interrupt and re-enter the survey [Ba03] [Sm97] [Li10]. Furthermore, the questionnaire presented here establishes a clear navigation path by indicating the start of each section and each question with sub-headings in order to allow for a comfortable and well-structured completion. All questions and answer options are arranged and grouped according to common reading patterns [MSB08]. For all questions (except the questions regarding respondents' characteristics) a "Don't Know" response option is provided in order to distinguish between respondents who chose a particular answer option and respondents who do not

[1] This section is based on the published results of the first part of the survey [MSP13].

know/are not willing to provide an answer. Such an answer option increases the reliability of the survey data and reduces the number of drop-outs [SFE02].

The response option for question seven (satisfaction with BPML) is implemented as a seven-options Likert-Scale ranging from "very unsatisfied" to "very satisfied". Likert-Scales are frequently used for measuring constructs in surveys as they are easy to construct and administer [Ba03]. With a seven-options Likert-Scale a "Middle Option" is provided. Seminal research results attribute a positive effect on the reliability and validity of the survey data to such a middle option [Li10]. Question eight offers a matrix with the list of the twelve audit relevant concepts (cf. section 2) on the y-axis and possible representation formats on the x-axis. A short description of each concept is given to ensure a common understanding among the respondents. Answer options for the documentation format are "narratives", "tabulated/structured", "graphical", and "no documentation" as these are the preponderantly used formats in the audit domain [BJJ07]. The answer options on both axes are randomly sorted to reduce the effect of answer options order [Li10]. In general, guidelines on questionnaires dissuade from using such a matrix question. However, the particular nature of the participants allows the usage of this question type as auditors are familiar with tables and matrices [MSB08].

With regard to language aspects, the questionnaire considers several recommendations regarding the length of questions (should not exceed 16 to 20 words [Br86] [Op00]), the type of questions (no double-barreled and no negative questions are used to reduce the level of complexity [ANP03]), the wording of a question (formulated in a simple way with simple grammar [DTB98] [SFE02], complex questions are broken down to a series of simple questions [MSB08]).

With a first version of the questionnaire a pilot test was carried out by carefully applying the guidelines defined by [ANP03] [Gr02] [LM05] [Ba03]. In total, the questionnaire was checked with eight test persons knowledgeable in process audits and/ or survey research. Based on the test results several adjustments were made especially regarding a more precise wording of the questions.

3.3 Population, Sampling and Data Collection[2]

This survey defines individuals knowledgeable in process audits and with working experience as internal or external auditors as target population. Due to an easier access to the target group the survey – in a first step - is limited to German-speaking countries. However, in our understanding this limitation is not likely to have an influence on the validity of the results for the audit domain in general since international audit standards force auditors to use homogeneous approaches worldwide, e.g. [IFAC10]. Moreover, the descriptive statistics on our respondents reveal that most of them work for large (audit) companies and therefore are confronted with diverse regulatory requirements of all important markets and regions world-wide. In terms of working experience the survey covers the operational (auditors conducting process-audit field work) as well as the management perspective (senior auditors responsible for audit planning and supervision).

[2] This section is based on the published results of the first part of the survey [MSP13].

To attract participants for our survey we utilized social and professional networks (e.g. XING), distributed invitations to members of large auditor associations (e.g. DIIR, ISACA), and post in subject-related online forums. Additionally, the Top 25 German audit companies[3] (based on [Lu12]) were contacted and we separately invited the internal audit departments of the Top 100 German companies to participate. The described approach constitutes a non-probabilistic method to select respondents (survey type: unrestricted self-selected survey) [Co00]. The analyses in *Section 4* consider this fact and especially pay respect to the validity of the findings for the target population. However, the purposeful distribution of invitations comprehensively covers the targeted population as the approach does not systematically exclude any sub-group. This results in a low coverage error (mismatch between the target population and the sample frame) [Co00]. Therefore, in our opinion the survey results reasonably reflect the current preferences on documentation formats in the audit domain.

The questionnaire was placed online for two months starting from October 15th until December 15th, 2012. A total of 463 respondents, participated. 370 respondents completed all four question parts.[4] These responses are the basis for our analyses.

4 Analysis and Results

4.1 Demographic Characteristics of Respondents

Table 3 presents descriptive statistics of the respondents and their organizations that are derived from the first section of the questionnaire. These statistics comprise the process audit experience (in years) and the job position of the respondents as well as the size (number of employees, number of employees in process audit department) and sector of their organizations. As the following analyses use these variables an understanding of their distribution among the respondents is beneficial. The distribution of the variables sector and size of the organization is especially noteworthy due to the uneven distribution. Hence, for sector analyses all respondents are grouped: the group of external auditors encompasses all respondents from audit companies, whereas the group of internal auditors includes all the remaining respondents. In terms of organization's size only the size of the process audit department is used as a proxy for the frequency of processes audits in the organization. From our point of view, this variable better reflects the relevance of process audits for an organization than simply the size of an organization.

[3] Including Deloitte, E&Y, KPMG, PwC, and BDO

[4] For comparison only, this number of respondents clearly exceeds the minimum sample size for a population of 10,000 individuals [BKH01].

Table 3: Characteristics of Respondent's Organization/ Respondent [MSP13]

Aspect	Values	# of Respondents	Percentage
Sector	Audit company	263	71 %
	Consulting	8	2 %
	Service sector	69	19 %
	Production sector	30	8 %
Number of employees in company	< 250	17	5 %
	250 - 1,000	21	6 %
	> 1,000	332	89 %
Number of employees in process audit department	< 10	65	17 %
	10 - 30	28	8 %
	> 30	277	75 %
Job title	Auditor	160	43 %
	Senior Auditor	147	40 %
	Head Internal Audit/ Partner	57	15 %
	Internal Controls responsible	6	2 %
Process audit experience (in years)	< 2	93	25 %
	2 - 4	95	26 %
	5 - 10	115	31 %
	> 10	67	18%

4.2 Usage of Process Modeling Languages in the Audit Domain

The second and third part of the questionnaire deals with the usage of BPMLs in the audit domain, more precisely their usage in the context of process audits. The participants are asked whether they use a BPML in a process audit and if yes which language they prefer. Answer options are widely known BPML which are discussed in the BPM domain [MTJ10]. Multiple answers are possible. The analysis reveals that only 23% of the respondents use a BPML when conducting a process audit (cf. Figure 1). 52 of these respondents use a specific software/ language for describing a business process under audit but none of the common BPMLs (group *Other*). Among the commonly known BPMLs the event-driven process chain (EPC) is most frequently chosen by the respondents (36). This corresponds to prior research results as this survey is limited to German-speaking countries where the EPC is especially widespread (cf. section 3.3) [Kr10]. The other common BPMLs are only used by a minority of the respondents (less than 2%).

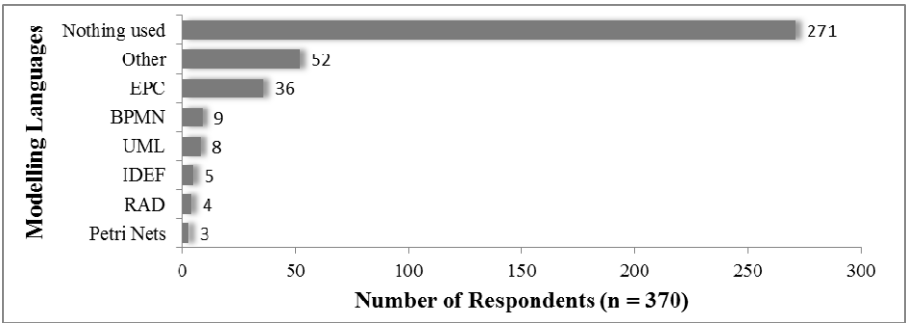

Figure 1: Usage of process modeling languages in the context of process audits

25 of the 52 respondents who do use a BPML but not a common one (group *Other* in Figure 1) state in a free-text field which software/ language they use for representing business processes. Most of these respondents indicate a firm specific language/ software (10) followed by narratives in MS Word/ Excel/ Powerpoint (5). Other software/ languages mentioned are process mining-software (2), ADONIS (2), VSM (1), MS Visio/ Access (1), entity relationship diagram (1), standards (COBIT, ITIL, BPM) (1), ARIS (1), and flowcharting according to DIN 66001 (1).

In a second step the study examines the influence of the factors *sector* (internal or external auditors), *size of the department dedicated to process audits*, and the *audit experience of the respondents* on the usage of a BPML. We utilize the Chi-Square and Cramer-V test ($\alpha = 0.05$ and degree of freedom (df) = 1)[5] in order to assess whether the frequency of responses on the BPML usage significantly differs depending on the influencing factors. The analysis shows significant but weak dependencies for the sector (Chi2 = 13.86; Cramer-V = 0.194) and the department size (Chi2 = 6.091; Cramer-V = 0.128). Accordingly, BPMLs are more often used by internal auditors and in smaller process audit departments. The factor audit experience shows no significant association with the BPML usage.

Those respondents who use a BPML (99, in Figure 1 multiple answers are allowed) are asked how satisfied they are with the usage in their everyday audit practice (seven-options Likert-Scale ranging from "very unsatisfied" to "very satisfied"). Based on the answers given the median, 0.25-Quartile, and 0.75-Quartile is calculated. The median of the answers is "rather satisfied" (5) with a small interquartile range from "neither/ nor" (4) to "satisfied" (6).

In summary, the results indicate that BPMLs are not widespread in current process audit practice. Moreover, when using a BPML auditors rather rely on firm specific languages/ software or standard office software (e.g. MS Word/ Excel/ Powerpoint) instead of common BPMLs. This might indicate that common BPMLs do not sufficiently meet auditors' requirements for annotating and analyzing audit-relevant concepts in a process model [Sa11] [Ca06]. However, auditors using a language/ software for modeling business processes are rather satisfied. Especially worth mentioning, BPMLs are more often used by internal auditors and in smaller process audit departments. This might indicate that external auditors and organizations with a larger process audit department/ higher process audit frequency focus on audit efficiency and therefore refrain from using more time-consuming documentation formats like process models. This interpretation is consistent with previous research results [BJJ07][BW04][Ho99].

4.3 Number of Documentation Formats for Key Audit Concepts

The fourth part of the questionnaire focuses on existing preferences among auditors regarding documentation formats of audit relevant concepts. The participants are asked to indicate for each audit concept the documentation format that is most supportive to conduct a comprehensive process audit. The survey permits multiple answers for each

[5] IBM SPSS Statistics Version 21.0.0.0 is used as analysis software.

audit concept in order to analyze in a first step whether auditors are more likely to use single or multiple documentation formats for a particular audit concept. The analysis shows that there are several audit concepts for which a clear majority of the respondents (>80%) prefer one particular documentation format. In contrast, for some concepts - especially *process flow* and *controls* – a larger proportion of the respondents (> 33%) rely on two or more formats. Figure 2 presents an overview of all audit concepts.

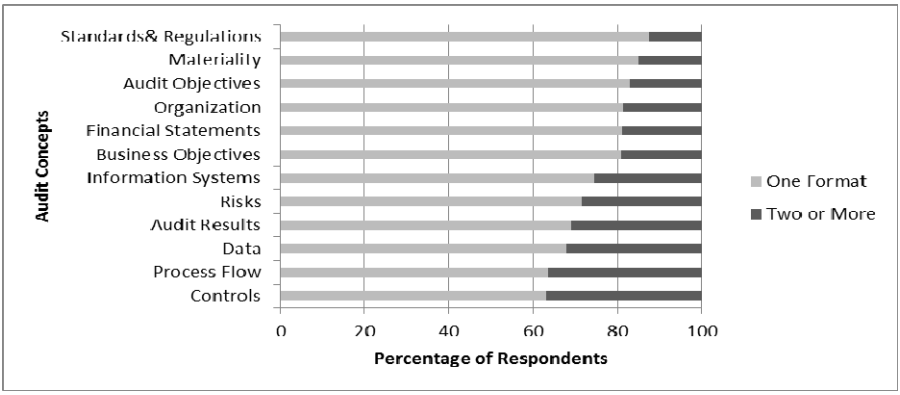

Figure 2: Number of Documentation Formats for Audit Concepts in the Context of Process Audits

Based on the responses for each audit concept the Chi-Square and Cramer-V tests are utilized to identify influencing factors for the decision on the number of documentation formats. The analysis on the sector ($\alpha = 0.05$ and df = 1) reveals that internal auditors are more likely to use multiple documentation formats than external auditors for the concepts *risks* ($Chi^2 = 12.916$; Cramer-V = 0.234), *controls* ($Chi^2 = 6.345$; Cramer-V = 0.159), and *audit results* ($Chi^2 = 5.337$; Cramer-V = 0.160). More experienced auditors ($\alpha = 0.05$ and df = 1) significantly more often use two or more documentation formats for the concept *risks* ($Chi^2 = 4.181$; Cramer-V = 0.133). Moreover, in organizations with small process audit departments ($\alpha = 0.05$ and df = 1) *risks* ($Chi^2 = 8.060$; Cramer-V = 0.185) and *controls* ($Chi^2 = 4.759$; Cramer-V = 0.138) are more frequently documented in multiple formats. Surprisingly, for the factor usage of a BPML (either used or not, yes/ no) ($\alpha = 0.05$ and df = 1) no significant dependencies could be revealed for the number of documentation formats.

In summary, the analysis results show that for most of the twelve relevant audit concepts auditors prefer a single format. Only for some concepts such as *process flow* and *controls* two or more documentation formats are used by a larger proportion of the respondents. For the concepts *risks* (sector, audit experience, size of process audit department) and *controls* (sector, size of process audit department) several factors could be identified that influence the decision on the number of documentation formats. Regarding the concept *controls* our results differ from previous research results as Bierstaker et al. 2007 found that auditors from large external audit firms (Big 4) are likely to use more formats than smaller organizations [BJJ07]. These differences may indicate that the decrease of the average number of documentation formats due to an increased competitive pressure which was found by Bierstaker and Wright 2004 for the period from 1995 to 2000 continues in particular in the external audit sector [BW04].

4.4 Type of Documentation Formats for Key Audit Concepts

In a second step the type of documentation formats for each audit concept is analyzed. As answer options the generic documentation formats "narratives", "tabulated/structured", "graphical", and "no documentation" are provided for each audit concept. Multiple answers are possible for each concept resulting in a category for a mixed documentation format in Figure 3. The answer option "no documentation" is chosen by none of the respondents as only concepts are listed in this question the respondent has previously indicated as relevant for a process audit. The analysis of the survey data for this question reveals clear preferences on the documentation format for four audit concepts. Information on *organizational aspects* of a process should be presented solely graphically or in a mix with other documentation formats (57%/16%). For information on *financial statements* a tabulated documentation format (single or mixed) is preferred by the majority of the respondents (63%/17%). A documentation as narrative is preferred for *standards&regulations* (64%/12%) and the *business objectives* that are related to the process under audit (57%/16%).

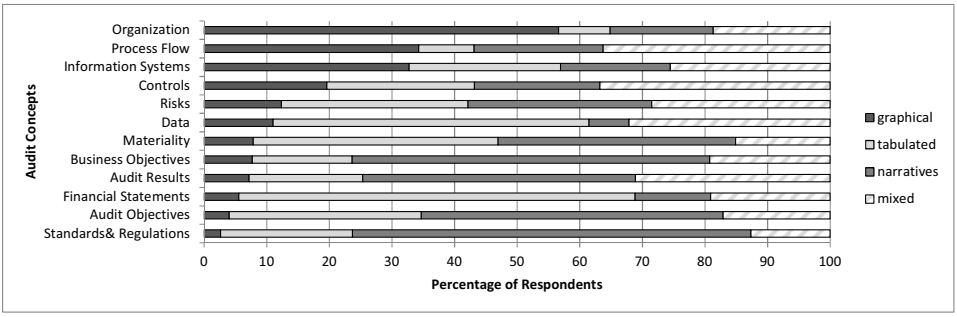

Figure 3: Type of Documentation Formats for Audit Concepts in the Context of Process Audits

For the other concepts the analysis shows more fragmented results. Regarding the concepts *materiality* (39%/38%/9%), *audit objectives* (31%/48%/13%), and *audit results* (18%/44%/14%) in sum more than three quarters of the respondents choose tabulated, narratives or a mixture of both as appropriate documentation formats. The same applies to the concept *data* for which the respondents indicate a tabulated and/ or graphical documentation (50%/11%/15%) as appropriate. In sum at least two thirds of the respondents prefer a tabulated (30%), narrative (29%) or a mix of both documentation formats (12%) for the concept *risks* whereas for the concept *information systems* a graphical (33%), tabulated (24%) or mix of both (10%) is favored. For the concept *process flow* a graphical (34%), narratives (21%) or mixed documentation (18%) is indicated as suitable. For the concept *controls* no clear preference could be derived from the survey data as the answers are almost equally distributed among the three documentation formats. Figure 4 summarizes the preferences on the documentation formats for each audit concept along with the summative empirical support in our survey data. We add up the percentages for each presentation format regardless whether it is chosen individually or in combination with another format. The rounded percentages above one-third of the respondents are denoted as small pie charts for each concept and documentation format.

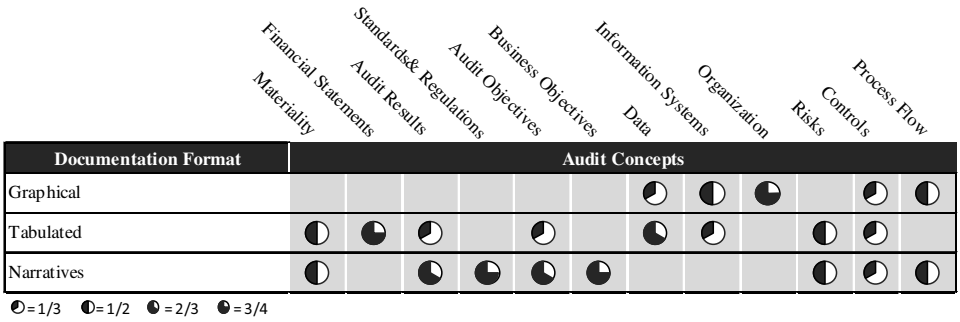

Figure 4: Summarized Preferences for Documentation Formats of Audit Concepts

For each audit concept we utilize the Chi-Square and Cramer-V test ($\alpha = 0.05$ and df = 3) in order to assess whether the frequency of responses for particular documentation formats significantly differ depending on the respondents' sector (internal or external auditor), process audit experience, size of the process audit department, and the usage of a BPML. For these analyses all respondents with more than one chosen documentation format for a single concept are grouped in the category "mixed". With regard to the sector the analysis shows significant but weak dependencies for the concepts *risks* ($Chi^2 = 13.50$; Cramer-V = 0.24) and *process flow* ($Chi^2 = 9.54$; Cramer-V = 0.196). For *risks* external auditors tend to prefer working with tables whereas internal auditors favor a mixture of tables and narratives. Concerning the *process flow* external auditors significantly more often mark tables or narratives as appropriate presentation format. In contrast, internal auditors more frequently rely on a graphical documentation of the *process flow*. The size of the process audit department is associated with the choice of the documentation format for the concept *risks* ($\alpha = 0.05$ and df = 3). Respondents from an organization with a large process audit department prefer tables compared to a preference on a mixed format for small departments. Regarding the respondents' process audit experience and the BPML usage the analysis reveals no further significant dependencies.

In summary, it can be concluded that among our respondents clear preferences on the documentation formats exist for several concepts. These might be considered when it comes to software/ method development for the audit domain. For process audits all audit concepts mentioned above are considered as relevant. This calls for an integrated representation. The identified preferences may help to find a suitable integration for auditors. An obvious starting point for integrating audit-relevant information is the process flow as it links all relevant audit concepts.

5 Conclusion and Future Research

The important role of auditors for our economy has become evident to the general public after a series of financial scandals occurred. However, at the same time these scandals underline that there is room for improvement in the current audit practice. Accordingly, topics related to a more comprehensive method/ software support for auditors gained momentum in academia and practice in recent years. Thereby, a focus is set on the audit

of business processes as this is an important audit type for current audit approaches. In this regard, we conducted an online survey among internal and external auditors knowledgeable in business process audits to gain new insights into the usage of BPMLs and preferences on documentation formats in the audit domain. Our results show that although there is a strong focus on business processes in the current audit practice BPMLs are not widely used by auditors to document the flow of a process. Moreover, when modeling a business process auditors more likely rely on firm specific languages/ tools instead of commonly known BPMLs. We interpret this as an indicator for a gap between the range of functions of common BPMLs and auditors' specific requirements. Regarding the documentation formats we identified clear preferences for the audit concepts *organizational aspects* (graphical), *financial statements* (tabulated), *standard&regulations* (narratives) whereas for other concepts mixed documentation formats are preferred (e.g. *process flow*, *risk*s). Furthermore, our results show that among respondents external auditors more likely focus on audit efficiency as they rely on fewer and less time-consuming documentation formats than internal auditors for several audit concepts such as *risks* and *process flow*.

The survey was limited to German speaking countries and participants were primarily from large companies. Extending the population regarding both aspects might reveal further insights as cultural difference may have an impact. Additionally, a non-probabilistic method was used to select survey participants. However, by applying pertinent guidelines for survey design and distribution we believe that our results portray a common understanding of documentation formats in the audit domain. The survey results support the development of a more comprehensive software support respectively a domain specific modeling language for complex audit tasks like process audits. They can be used as a basis to better address auditors' requirements in terms of information presentation. Topics related to these aspects remain at the top of our research agenda. Yet, due to the relatively few prior research work on documentation formats in the audit domain, future research work is needed to complement the gained insights. From a behavioral perspective it is beneficial to investigate the influence of audit firm policies or the documentation of previous audits on the choice of number/ type of documentation formats [BJJ07]. In addition, the effect on the audit efficiency and effectiveness of different documentation formats for each audit concept would be of high value for auditors. In the long run, not only auditors would benefit from increased audit effectiveness and efficiency but all stakeholders of the global economy.

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