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Continuous Auditing: A Practical Maturity Model

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CONTINUOUS AUDITING: A PRACTICAL MATURITY MODEL

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Abstract

Continuous Auditing (CA) is a methodology for issuing audit reports simultaneously with, or a short period of time after, the data is entered into the information system. The possibilities and challenges of CA have been researched previously. However, limited studies focus on the practical application of CA maturity models. In this study, we bridge this gap by developing a maturity model, including measurements to evaluate the current state of an organizations' CA. To accomplish this goal, we adopted a focus group approach to create the maturity model in multiple iterations. During these iterations, the model was developed in concurrence with three pension funds, one accountancy firm, one mortgagor and two consultancy firms for the pension market. This resulted in a maturity model, which consists out of five maturity levels and four capabilities. The maturity levels are: 1) initial approach, 2) ad hoc approach, 3) defined approach, 4) managed approach, and 5) optimized approach. The four capabilities are: A) systems, B) data, C) organization, and D) people.

Keywords: Continuous Auditing, Maturity Model, Pension Market.

1 Introduction

Auditing practices have changed from full population auditing to sampling and risk-based approaches. In recent years discussion existed to change back to full population auditing. This is caused by two reasons. First, the evaluation of information technologies allows for full population auditing, and secondly, the corporate scandals that have occurred, ask for it. However, not only the information technology with respect to auditing has advanced, the same applies to the information technology used by their clients. Researchers find that the adoption of technology by the organizations increases at a faster pace than the adoption by the auditing firms. One reason for this is that auditing firms and accountants apply older information technology in their audits and lack knowledge about newer technologies. The lack and knowledge about data and systems as well as the application of older questions raises questions about a holistic approach.

A holistic approach to auditing is continuous auditing. Continuous auditing (CA) is defined as (CICA/AICPA, 1999): *"a methodology for issuing audit reports simultaneously with, or a short period of time after, the occurrence of the relevant events."* (Eric Byrnes et al., 2012). This can only be realized by auditing directly on source data or on derived data. Therefore, an important competence to realize CA is the IT capability. However, it's not the only capability because people and processes also need to be in place. Although previous research on CA has been conducted. Only a few studies have been conducted on the performance of CA. Performance (classification in a certain maturity level) is often measured by the utilization of maturity models. Maturity models enable organizations to assess their current situation and provide handholds for improving their situation. An example of a maturity model is the Capability Maturity Model (CMM) proposed by Paulk et al. (1998). The CMM was originally developed to support organizations in improving their software process, but the success of the model made that different versions of the model appeared to suit other disciplines as well. Several maturity models are known in the IT domain. In order to make organizations more suitable for the introduction of CA, we started working with a number of experts on the basis of existing maturity models. Based on literature research in the area of CA, and on the basis of existing maturity models, we have organized knowledge sessions together with experts from the pension sector. This research project aims toward the development of a holistic and practical CA maturity model, which facilitates the assessment of CA capabilities. To construct the model mentioned above, the following research question is formulated: *"How can the different stages and the improvement of continuous Auditing be measured?"*

The remainder of this paper proceeds as follows. The next section, section two, summarizes the topics that are related to this research. First the general state of auditing is explained, after which the state of information technology for auditing is described. After this the relation between the two is explained. Section three describes the research approach applied for the development of the CA maturity model. In section four, the data collection and analysis are described. The actual maturity model is described in section five. Finally, the paper concludes with section six where the conclusions, limitation and further research are described.

2 Literature review

One of the main objectives of auditing is to provide an independent examination of an organizations financial, and non-financial, statement to determine if they present a fair view of the organizations status. This demands the need for correct and timely financial information. The manner in which this information is collected and analyzed has changed over the last decades (IAASB, 2013). During the first period (pre-1980) there were relative small data populations and auditors analyzed the full population, without sampling. During the 80's up to till 1995 the size of the datasets increased, and the concept of sampling was introduced. Additionally, new Computer-Assisted Audit Techniques (CAATs) were developed and existing CAATs were further developed. In auditing literature this time period is called a

substantive based approach which is followed by the risk-based approach from 1995 to 2002. In this time period the data became more complex and audits became largely systems based and less focus was put on detailed testing. Auditors put more focus on manual, automated and information technology (IT) dependent controls and IT general controls (ITGCs) as well. Additionally, the second part of the risk-based period (2002-2014) is characterized as a more balanced top down risk-based audit approach, in which there was a development of substantive testing for all major balances and transactions. The current period, from 2014 till the present day, is called data enabled auditing in which the focus again is on testing the full population based on new and existing data techniques.

The application of data techniques is not new in auditing. In their research Thomas Lin et al. (1979) proposed among others 1) the utilization of pattern recognition techniques in the identification of abnormal trends in audit data and 2) the utilization of factor analysis for the analytical review process. Since then multiple different techniques are proposed to support the auditor to provide an independent examination of an organizations financial, and non-financial, statements to determine if their present a fair view of the organizations status. Examples of such technologies are: CAATs (Sayana, 2003), Data Analytics (Cao, Chychyla & Stewart, 2015) (Earley, 2015), expert systems (O'Leary & O'Keefe, 1997), decision aid (Dowling & Leech, 2007), Generalized Audit Software (GAS) (Kim, Kotb & Eldaly, 2016), on-line auditing systems (Van Der Aalst et al., 2011), predictive business analytics (Good & Guidance, 2011), and prescriptive analytics and real-time audit mechanism based on compression techniques (Li, Yen & Chuang, 2016).

CAATs is an umbrella term for individual tools that support the auditing process. Examples of CAATs systems are 1) tests of details of transactions and balances, 2) analytical review procedures, and compliance tests of IT (information technology) general controls (Tuttle & Vandervelde, 2007). An additional umbrella term is Online Auditing Tool (OLAT) (Van Der Aalst et al., 2011). An OLAT is a collection of continuous monitoring tools connected to the organization's information system but is not a part of it. In addition auditors also tried the implementation of expert systems (ES) in accounting, auditing and tax (Michaelsen & Messier Jr., 1987). An expert system is a set of techniques and methods for building systems that support, augment or automate decision making. However, research has not systematically examined issues that lead to improvement in problem solving or the impact of ES on supervision. Each of the previous described technologies are a separate part of a Continuous Control Monitoring System. In addition, previous research primarily has focused on expected benefits derived from the technology and "conventional wisdom", rather than the impact on organizational roles (O'Leary & O'Keefe, 1997). Technological changes and audit firm mergers over the last decade raise the question as to whether the decision aids reported in prior research are representative of the types of decision support currently employed in audit firms (Dowling & Leech, 2007). This is strengthened by research of Cao et al. (2015) who state that (advanced) analytics have been wide spread, however it is hardly applied by auditors. A research conducted under Egyptian external auditors also reinforces these results (Kim, Kotb & Eldaly, 2016). These results show that the basic features in Generalized Audit Software (GAS), for example database queries, ratio analysis, and audit sampling, have a higher use than the advanced features: digital analysis, regression/ANOVA, and data mining classification. In addition, also the perceived usefulness and perceived ease is higher for the basic features than the advanced features. The analysis also supports that the use of GAS by Egyptian external auditors is more affected by co-worker, supervisor, but not by job relevance (Kim, Kotb & Eldaly, 2016). Based on this fact and the fact that only simple functions are used, raises questions about the digital skills of the auditor. Hunton and Rose (2010) state in their study that the digital skills of auditors are something to pay attention to by indicating that the development of complex financial instruments have created highly intricate economic risks and valuation issues that may surpass the ability of auditors to evaluate using current skills and technologies.

New complex financial instruments as well as the advances in information technology have renewed the attention in an concept from the 80's: continuous auditing (Vasarhelyi 1983). Continuous Auditing (CA) is a methodology that enables independent auditors to provide assurance on a subject matter, using a series of auditors' reports, issued simultaneously with or a short period of time after, the occurrence of events underlying the subject matter. Vasarhelyi (1983) already published the groundworks for CA in the early 80's. From this point on, two streams started to exist. Those who view CA purely from a technical perspective and those who view CA from a holistic perspective. Examples of existing CA models can be found in Flowerday et al. (2006). Li et al. (2016) present a comparison of five different Continuous Audit Mechanisms. We agree with authors that CA should be viewed from a holistic and practical perspective. Hardy and Laslett (2015) state that still limited guidance about the practicalities of CA are researched. Based on the fact that we agree that CA should be viewed from a holistic perspective and should be practical, we set out to define a holistic approach from a practical perspective. An instrument to view a topic from a holistic perspective is a maturity model (Rosemann & Bruin, 2005).

Maturity models are a well-known instrument to support the improvement of functional domains in IS (Information Systems), like software development or testing. While maturity models may share a common structure, they have to be developed anew for each functional domain (Van Steenbergen et al., 2010). According to Derriks (2012) the majority of the maturity models use a five stage maturity approach (Paulk, 1998), (Koehler, Woodtly & Hofstetter, 2015)(Object- Management-Group, 2008), (Rohloff, 2009), (Rosemann & Brocke von, 2010), (Harmon, 2004), (Fisher, 2004), and only a few use a three (Rummler-Brache-Group, 2004), four (Hammer M., 2007) or six stages approach (Melenovsky & Sinur, 2006). A well-known 4 stages audit maturity model is the one of Vasarhelyi et al. (2012).

3 Research method

The goal of this study is to create a practical maturity model for continuous auditing. The maturity of the continuous auditing research field, with regard to frameworks, is nascent. An appropriate focus of research in nascent research fields is on identifying new constructs and establishing relationships between identified constructs (Edmondson & Mcmanus, 2007). Therefore, through grounded theory-based data collection and analysis we constructed a model.

For research methods related to exploring a broad range of possible solutions to a complex issue - and combine them into one view when a lack of empirical evidence exists – group-based research techniques are adequate (Delbecq & Van de Ven, 1971)(Okoli & Pawlowski, 2004)(Ono, Wedemeyer, 1994). Examples of group-based techniques are focus groups, Delphi studies, brainstorming and the nominal group technique. The main characteristic that differentiates these types of group-based research techniques from each other is the use of face-to-face versus non-face-to-face approaches. Both approaches have advantages and disadvantages; for example, in face-to-face meetings, provision of immediate feedback is possible. However, face-to-face meetings have restrictions with regard to the number of participants and the possible existence of group or peer pressure. To eliminate the disadvantages, we combined a face-to-face technique, namely: "focus groups", together with the opportunity to provide feedback after each session.

4 Data collection and analysis

The data for this study is collected over a period of nine months, between July 6th, 2017 and March 22th, 2018, through two series of a six-round coding and a five-round focus group, see Figure 1. This approach is applied for the maturity levels, the factors and the description of both. Between each indi-

vidual round of coding and focus group, the researchers consolidated the results. Both methods of data collection are further discussed in the remainder of this section.

Research Team	Experts: Focus Group (FG)
Round 1: **Coding**	
	Round 1: **Elicitation, Refinement and Validation**
Round 2: **Consolidation & Coding**	
	Round 2: **Elicitation, Refinement and Validation**
Round 3: **Consolidation & Coding**	
	Round 3: **Elicitation, Refinement and Validation**
Round 4: **Consolidation & Coding**	
	Round 4: **Elicitation, Refinement and Validation**
Round 5: **Consolidation & Coding**	
	Round 5: **Finalization**
Round 6: **Consolidation & Coding**	

Figure 1. Data Collection and Analysis

Before a focus group is conducted, a number of topics need to be addressed: 1) the goal of the focus group, 2) the selection of participants, 3) the number of participants, 4) the selection of the facilitator, 5) the information recording facilities, and 6) the protocol of the focus group (Morgan, 1996). For this study, the goal of the focus group meetings was to identify element of the CA framework and refine the framework. The selection of participants should be based on the group of individuals, organizations, information technology, or community that best represents the phenomenon studied (Strauss & Corbin, 1990). In this study, four types of organizations and individuals have been invited, namely pension funds, mortgagers, consultants to pension funds and auditors. The organizations that agreed to co-operate with the focus group meetings were the: 1) APG, 2) PGGM, 3) AZL, 4) Obvion, 5) PNA-Group and 6) Sprenkels and Verschuren.

Based on the written description of the goal and consultation of employees of each organization, participants were selected to take part in the 5 focus group rounds. In total, twelve participants took part in the focus groups regarding the elicitation capability. The following roles were included: 5 pension fund domain experts, two internal auditors, two IT-Auditors, one external accountant and two consultants. Each of the participants had at least five years of experience with auditing or auditing & information systems. Delbecq and Van de Ven (1971) and Glaser (1978) state that the facilitator should be an expert on the topic, and familiar with group meeting processes. The selected facilitator who is a Ph.D. in information systems and works for the finance and economics department, conducted eight years of research on related topics and facilitated many (similar) focus group meetings in the past. In addition to the facilitator, six additional researchers were present during the focus group meetings. Two researchers participated as 'back-up' facilitator who monitored whether each participant provided equal input, and if necessary, involved specific participants by asking for more in-depth elaboration on the subject. The remaining four researchers acted as secretaries. On average, the time spent on a focus group was three hours.

Every focus group meeting followed the same protocol, each starting with an introduction and explanation of the purpose and procedures of the meeting. After the introduction, ideas were generated, shared, discussed and refined by the participants. Prior to the first round, participants were informed about the purpose of the focus group meeting. Furthermore, the participants were invited to submit secondary data regarding known continuous monitoring and continuous auditing frameworks and im-

plementations. When participants had submitted their secondary data, they had the opportunity to elaborate upon their input during the focus group meetings.

After each focus group, the researchers analyzed and consolidated the results. The results of the analysis and consolidation were sent to the participants of the focus group one week in advance for the next focus group meeting. During these weeks, the participants assessed the consolidated results in relationship to three questions: 1) *"Is the framework described correctly?"*, 2) *"Do we need to address additional elements in the framework?"*, and 3) *"Do we need to remove elements from the framework?"* This process of conducting focus group meetings, consolidation by the researchers and assessment by the participants of the focus group was repeated four more times (round 2, round 3, round 4 and round 5). After the fourth focus group meeting (round 4), saturation within the group occurred. This resulted into a consolidated continuous auditing maturity model.

Data analysis was conducted in five cycles of coding, following Strauss and Corbin's process (2008) of 1) open coding, 2) axial coding, and 3) selective coding. Before the first focus group and after each focus group, open coding was conducted, involving the analysis of existing frameworks, documentation provided by participants and significant participant quotes, by the individual researchers. The existing frameworks are: KPMG (2013), Vikas Dutta (2012), Rutgers, Vasarhelyi (2012), EY (2009), Satori Group (n.d.), IIA and NBA (2016), Kuhn & Sutton (2010), IIA (n.d.), CTAG (Ames et al., 2015), Visual Risk (n.d.), Deloitte (2011), and PWC (2011). In this process, the researchers tried to identify what Boyatzis (1998) refers to as 'codable observations'. Here, the researchers coded the data by identifying A) maturity model stage names and B) maturity model content were discussed. To illustrate this process one example is provided here. In the first round of the codable observations was as follows: *"financial ratio's"* in the framework of Vasarhelyi (Chan & Vasarhelyi, 2011). This was a part of the capability *"analytical methods"*. During the second round the capability and content had been transferred one-on-one into the model. During the third round the content *"financial ratio's"* is still transferred one-on-one however the domain *"analytical methods"* has been removed and *"financial ratio's"* is put under the organization dimension. During the second focus group an elaborated debate around the term *"financial ratio's"* emerged. Fueled by the idea of integrated thinking, respondents argued that *"financial ratio's"* limited the actual measurements too much. Also, a second discussion emerged about the fact if ratios are data or are an organization decision. Where the respondents until now shared *"financial ratio's"* under *"analytical methods"* they decided to put it in under *"organization"*. Therefore, during the fourth round the content *"financial ratio's"* is transformed into *"ratio's"* and put under the data domain. In the last focus group, no additional discussions have taken place regarding *"ratio's"*. Therefore, during the last (fifth) round no additional changes were made.

5 Results

In this section the results of the research are presented. To ground our presentation, we refer to figure 2 which presents a snapshot of the final maturity model. Due to space constraints, only a snapshot of the model is provided, and the levels and capabilities are described high-level. First, the maturity levels are presented, after which the capabilities are discussed.

Maturity Level 1: Initial approach

At this level, some processes have been defined, but these are inconsistently implemented in practice. The initial approach is therefore ad hoc, unstructured, informal, chaotic and is mainly carried out on a reactive basis to understand and solve bottlenecks in processes. The controls are limited, with little research being carried out into the consistency and correctness of economic transactions (transaction level). A formal audit team is lacking and a solid infrastructure for the internal audit activities has not yet been established. The reliability of the initial approach is based on the personal skills and the degree of objectivity of the employees working in different departments.

	Stage 2 - Ad hoc Approach
Systems	Localized, No-Normalized, Extract-Transform-Load Software
	Localized, No-Normalized, Scripting / Analysis Software
	Localized, No-Normalized, Reporting Software
Data	Ah-hoc data-analysis
	Localized approach for data analytics (methodology)
	Localized procedures for data analytics (performed ad-hoc)
	Ad-hoc access to data-sources
	Access to derived data
	Data quality is not enforced
	Only analyses on ratios
	Reactive, centralized data-governance
Organization	Localized key ratio's
	No specific monitoring on transaction level
	No detective alarm and follow-up process
	Organisational: high human dependency
	IT-Organisational: low IT dependency
	No Extract-Transform-Load Expert
	No Script Builder
	No championing
	(Internal) Accountant
	Independent IT-Auditor
	No PDCA Cycle
	Data-ownership function defined
People	No specific competence requirements ETL-Expert
	No specific competence requirements script-builder
	No specific competence requirements champion
	Well developed competence (internal) Accountant
	Limited developed skill IT-Auditor

Figure 2. Snapshot of Maturity level 2: Ad hoc approach

Maturity level 2: Ad hoc approach

The input of process discipline ensures that basic audits and processes are carried out on a regular basis. The purpose and responsibility of the audit activities have been laid down, but these may still be organization-dependent and a plan of approach for quality assurance, improvement and real time monitoring is lacking. For the ad hoc approach, the information that is obtained, the resources that are used and the people carrying out the control tasks, an organization policy is drawn up. Qualitative and quantitative measures are applied, these may be trends that are derived from financial statements in combination with benchmark results from the relevant sector. This information is used to confirm and validate the results from the traditional initial approach. In order to achieve an honest ad hoc approach, standards are defined for the assessment of audits, processes are identified, a start is made with the formation of an audit department (software / system quality assurance group), and a start is made with the recruitment of people with the right competencies and relevant skills to be able to carry out the work. The reliability of the ad hoc approach remains dependent on personal skills and the objectivity of people. In comparison with level one, the ad hoc approach is more disciplined and meets the basic needs of the organization because processes have been standardized. The ad hoc approach is also focused on the systems used and the course of the defined processes.

Maturity level 3: Defined approach

The defined approach is formal, fully standardized, consistent and the policies and procedures are defined, documented and integrated into the infrastructure of the organization. The emphasis is now on process maturity and the continuous risk assessment is focused on changes in the organization, weaknesses in controls and business performance. The quantitative and qualitative measures for risk assessment are geared to the business risks with the highest priority. The business risks and audit areas are re-prioritized based on the company risk profile and the risk appetite and coverage are further optimized by using data analysis. The types of data analysis that can be applied; descriptive, diagnostic and / or a mild form of predictive. The tools that are used to analyze data are used to identify risks that lie outside the set risk appetite parameters. These analyzes are performed at more frequent and fixed time intervals and are focused on processes so that the execution is monitored and assessed. A start is given to real-time checks and analyzes, and the defined approach is carried out by the recruited and / or trained people with the required skills.

Maturity level 4: Managed approach

The managed approach is fully integrated as part of the management and risk management of the organization, with the focus on proactive risk identification. Analyses contain both internal and external data and the resulting results are compared with benchmark data from the relevant sector. The quantitative and qualitative measures are balanced and fully integrated in the audit work to achieve strategic objectives and continuously improve performance. Business processes use business intelligence and continuous monitoring for the assessment of business risks, financial and operational results and to reprioritize and rank audit trigger events and risks to control intervals (daily, weekly, monthly, quarterly). The reliability, risk appetite and coverage are even more optimized by applying predictive analysis tools that are widely applied by the organization. The data analyses are generated from the business units to speed up, postpone or reject the audits. By linking these analysis techniques to the KPIs (Key Performance Indicators), KRIs (Key Risk Indicators) and historical results, there is a dynamic managed approach. Processes are coordinated in such a way that sufficient certainty can be offered at operational level to achieve the objectives of the organization. Prescriptive analysis is introduced at this level.

Maturity level 5: Optimized approach

The ultimate maturity level (optimized approach) is characterized by a more extensive and consistent use of continuous advanced analysis tools consisting of predictive and prescriptive techniques. Strategic objectives and business process risks are monitored through the application of business intelligence, and the changing external environment of the organization is monitored by the implemented optimized approach. Both internal and external information is used to optimize the assessment of policy, risk management and control activities. KPIs and KRIs are continuously aligned with the strategic objectives, and the strategic risks consist of both internal and external factors.

Following on the 5 maturity levels, we describe our 4 capability areas:

Capability 1: Systems

To optimize the completeness and availability of data, it is important to realize a homogeneous system environment. Which means that the information systems used are connected to each other so that data flows between the information systems and access to these data. A standardized information system combined with an honest data entry ensures reliable data output. Relevant Key Performance Indicators (KPIs) are derived from these systems. In the realization of a homogeneous information system, the most important risk areas and the most important risk indicators are monitored. In case of deviations that are detected by the system, an alarm message is given to take immediate action. In order to arrive

at a continuous optimized approach from an initial approach, the following question must be posed; does the software support the extraction of data from external sources and is this data transformed into operational needs? It is also important to assess whether the software is applied by one specific person, a limited number of people or a group in the organization and whether the software is supported or not supported by centralized software management.

Capability 2: Data

How is data analyzed, what are the possibilities to analyze this data and what is the quality of data? These concepts are central to the 'data' area. The process of data analysis is based on the following steps: data is extracted from the systems, then transformed into information and finally analyzed in order to finally come to a decision about a certain process in the organization. In order to produce a correct analysis of the data, it is important that these data meet a number of quality requirements. These requirements include integrity, completeness, validity, readability, topicality, originality and consistency. Data integrity means that data in the information systems must be reliable and accurate throughout the life cycle. Data integrity begins with the user entering data. Data must be recorded at the time of observation. The original source data must be accessible at all times and kept in its original form. In order to arrive at a continuous optimized approach from a traditional initial approach, the following questions need to be asked; do the information systems contain the same data formats, to what extent is the data quality consistently guaranteed and is the data available at all times (real time)?

Capability 3: Organization

What is the company's strategy and objective regarding continuous auditing / monitoring, and what is the vision of the management? In order to link a continuous optimized approach to the strategy, objectives and vision, it is customary to use a risk-based finance plan in which the finance strategy is aligned with the strategic objectives and goals of the organization.

Capability 4: People

The executors must first of all understand the objectives and requirements of continuous auditing / monitoring. Just as well, good insight must be gained into the most important business processes, the information systems used and the associated infrastructure (the controls and the data contained therein). In addition, they must have skills to analyze the available data and to identify the most important control elements and risk areas of the organization. The role of the current controller will change as continuous auditing / monitoring is implemented more broadly in the organization. Related departments need to work together, and new functions / tasks will be created, including an Extract-Transform-Load Expert and a Script builder. To come from a traditional initial approach to a continuous optimized approach, the following questions need to be asked; are the employees involved aware of their new tasks, responsibilities and the role that is being performed? Should consideration be given to attracting new personnel who have knowledge about a particular area or is further training necessary for current staff?

6 Conclusion and future research

The existing body of knowledge on the application of information technologies in auditing is characterized by a predominant focus on a singular tool for a singular problem. While a small amount of contributions focusses on a more holistic approach. Therefore, the objective of this study is to find an answer to the following research question: *"How can the different stages and the improvement of Continuous Auditing be measured?"* We have answered this question with a CA maturity model, presented in this research. The first version of the maturity model is based on literature, after which it has been redefined in 5 validation iterations. Based on the results of the 2 interview rounds, the maturity

model has been further redefined, which led to a model that consists out of five maturity levels and four factors. The maturity levels are: 1) initial approach, 2) ad hoc approach, 3) defined approach, 4) managed approach, and 5) optimized approach. The four capabilities are: A) systems, B) data, C) organization, and D) people. This study makes a number of contributions. From a theoretical perspective, it fills a gap in the literature concerning a more holistic approach on continuous auditing. Additionally, it answers the call for more practical oriented research on CA. This paper aims, from a practical viewpoint, to provide a structure to the knowledge on this topic. From a practical perspective, the results of this study could guide organizations by providing a blueprint for CA, leading to more effective planning and implementation of auditing capabilities. With our research we extend the existing studies. We present a 5 stages maturity model, existing of 4 capabilities and 28 factors. With our model it is possible to evaluate the current state of an organizations' CA.

Some limitations of our study must be acknowledged. The first limitation stems from the sample of organizations that participated in the data collection. Although the respondents came from a mix of organizations, namely pension funds, mortgagers, consultants to pension funds and auditors, the sample size is limited. One could argue that the results of this study are only limited generalizable. This is strengthened by the second limitation. The second limitation is the approach, which consisted of all qualitative data collection and analysis techniques. One characteristic of qualitative approaches is the limited generalizability of the findings towards similar and dissimilar contexts, thus our CA maturity model. However, research studies concerning nascent maturity research directions often utilize qualitative approaches that focus on (Edmondson & Mcmanus, 2007): "*identifying new constructs and establishing relationships between identified constructs.*" Applying quantitative research approaches would improve the generalizability of the framework and its concepts nevertheless.

In this study, CA is explored in the context of Pension funds. Future research should therefore focus on CA outside the pension funds. Second, challenges and situational factors regarding CA still need to be identified and validated thoroughly. Furthermore, it is to be expected that situational factors also (significantly) influence human resources, implementation challenges and principles. Research into these relationships are also an important avenue for future research. Last, the maturity model presented would benefit from further validation and possible additions in future research in which quantitative approaches are utilized that allow for better generalizability.

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