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Lessons learned in moving to Continuous Auditing,

applicable for the public sector

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BACHELOR THESIS

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Lessons learned in moving to Continuous Auditing, applicable for the public sector

by

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Abstract

For decades, organizations have shown interest in more continuous methods to monitor and audit their business processes. The 'Continuous Auditing and Monitoring'-paradigm promises large expected benefits in efficiency and effectivity. Recently, urgency has risen, practical solutions have been introduced, and first implementations have been achieved. We have interviewed the frontrunners from various relevant backgrounds, generating applicable focus areas, including differences between sectors, in processes, and paradigm-specific challenges.

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Chapter 1

Introduction

The accounting industry has changed tremendously in recent years. Financial controllers and auditors perceive a need for increased assurance on financial information, discerning several causes. Firstly, compliance measures have become stricter, including but not limited to the Sarbanes-Oxley (SOx) act. Secondly, recent fraud scandals have eroded public confidence in financial reporting (Murcia, Souza, & Borba, 2008). Thirdly, as the real-time economy has arrived, being relevant, cost-effective and competitive requires organizations to use new techniques and skills (Vasarhelyi, Teeter, & Krahel, 2010).

A financial auditor's main responsibility is *"to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement - whether due to fraud or error - thereby enabling the auditor to express an opinion on whether the financial statements are prepared, in all material respects, in accordance with an applicable financial reporting framework"* (International Auditing and Assurance Standards Board, 2009).

The traditionally used audit standard, generally relying on manual samples, is regarded as outdated and will soon be passé (Chan & Vasarhelyi, 2011). There has been a shift of focus from manual to technology-based audit (Bierstaker, Burnaby, & Thibodeau, 1998), falling in a larger trend in organizations in moving towards working more data-driven. Audit is traditionally performed only once a year. Therefore, the audit is never current, always retrospective. This could be changed by using more continuous analysis and automation. There is much to gain; approximately 68 percent of the traditional audit can be automated (Vasarhelyi, Alles, & Williams, 2010, p. 11).

Continuous Auditing (henceforth referred to as CA) describes the situation whereby instead of performing an audit once a year, processes can rely on data continuously. By its inherent focus on high frequency and automated processes, it is expected to bring enhanced relevance and timeliness (Vasarhelyi & Halper, 1991). This is a hot-topic with high interest,

being promoted by all Big Four accounting firms, which can use results to advise clients. Improving the capability to change and learn throughout the year makes this audit paradigm particularly interesting. *Continuous Monitoring* (henceforth referred to as CM), a related term describing monitoring processes continuously, is often mentioned in this context as well. These paradigms intend to be a solution, but are yet to be fully proven by actual results in practice (Kiesow, Schomaker, & Thomas, 2016).

Chapter 2

Theoretical Framework

As early as the early nineteenth century, there was a widespread adoption of auditing methods in business, growing due to the industrial revolution (Byrnes et al., 2018). Around 1900, the formalized internal audit function was introduced, responsible for *"careful collection and interpretive reporting of selected business facts to enable management to keep track of significant business developments, activities, and results from diverse and voluminous transactions"* (Mautz, 1964). Gradually, the scope extended towards verifying nearly all financial transactions, and auditing the management itself, instead of being a tool for management (Reeve, 1986). In this respect, the term *accounting* refers to the processing of financial information, whereas *auditing* refers to the examination of said information. In the United States, auditing became an obligatory process after the stock market crash of 1929 (Ramamoorti, 2003). Five years later, accounting standards and auditor oversight functions were formalized further by the, still active, Securities and Exchange Commission (SEC) (Byrnes et al., 2018). In the decades following, auditing using inspection and observation became the norm, exclusively using manual auditing procedures.

In the late 1980s and early 1990s, the business environment of accounting went through numerous substantial changes. This *electronization* (Flowerday, Blundell, & Von Solms, 2006) of business lead to electronic accounting systems, where paper had been the norm previously (Bierstaker et al., 1998). As the conventional audit trail relied on documents in paper form, it changed to performing tests and gathering electronic evidence (Helms & Mancino, 1999). Still, the focus of audit remains on manual detection (Bierstaker et al., 1998), but is expected to shift towards technology-based prevention.

Concluding, accounting and auditing standards have not kept pace adjusting to the capacities of data in recent years either, maintaining an emphasis on presentation, aggregation, and sampling. Even though change in this field is slow, IT possibilities have grown tremendously recently. Even in situations with incomplete datasets, more advanced audit data analytics

are now possible (Krahel & Titera, 2015). To exploit these options, Continuous Monitoring (CM) and Continuous Auditing (CA) come in. Becoming IT-driven, this subject has become relevant to our field of study: computer science and economics.

2.1   Reviewing change

This chapter provides an overview on literature on Continuous Monitoring and Continuous Auditing. A systematic literature review is performed to determine the state of literature, to broaden and deepen knowledge in this field, and to allow us to find a research gap. We already expounded an overview on the history of CM/CA, and continue by discussing the relevant definitions and models, and by presenting the published effects. We end this chapter by deriving the research gap and problem statement.

2.1.1   Literature approach

To collect and narrow down our results, we perform a search for articles in this field using the following search key, resulting in 59 scientific articles found on Google Scholar.

```
("continuous monitor*" OR "continuous audit*" OR
 "continuous control monitoring" OR "continuous controls monitoring")
AND
("financ*")
AND
("process" OR "processes")
```

The term *Continuous Auditing* refers to the concept as it was coined in 1989 (Groomer & Murthy, 1989), and extensified in 1991 (Vasarhelyi & Halper, 1991). Many of the articles since then have been written or co-published by the latter named researchers at Rutgers University, as it stands out in our bibliography. The concept was implemented first at AT&T and later at several other large companies, though limited. Interest in CA has grown, academic research is active, and interest in the private sector is particularly apparent. Major interest is generated by promises of a reduction in labor intensiveness (Elliott, 1998) and an increase in production efficiencies (Menon & Williams, 2001). The concept has been researched academically extensively for over two decades, and now actual audit practice is observable (Alles, Kogan, & Vasarhelyi, 2008).

We then screen and narrow down to the titles most related to this research subject, and perform an in-depth analysis. We proceed by executing more searches in this field based on

most cited references and its authors. We now again reduce the pool to articles familiar with the terms Continuous Monitoring or Continuous Auditing, or those limited to financial audit. A number of articles briefly mentioning CM/CA, but going further into subjects as *IT Audit*, *fraud prevention*, *Lean/Six Sigma*, *finance automation* and *continuous improvement*, were scanned as part of broadening our knowledge, and then assessed as outside of our scope. Additional searches were performed through the online catalogues of *Leiden University* and *Erasmus University Rotterdam*, but did not generate additional results.

2.1.2   Definitions of Continuous Monitoring

We compare the definitions on Continuous Monitoring, as found in the articles read.

Source	Definition
(CICA & AICPA, 1999)	a process to ensure that policies and processes are operating efficiently and to assess adequacy and effectiveness of controls
IIA (Coderre & RCMP, 2005)	encompasses the processes that management puts in, place to ensure that the policies, procedures, and business processes are operating effectively
(ISACA, 2002)	allows an organization to observe the performance, of one or many processes, systems or types of data
(KPMG, 2008)	a feedback mechanism used by management to ensure that controls operate as designed and transactions are processed as prescribed
(Deloitte, 2010)	an automated, ongoing process that enables management to continually review business processes for adherence to and deviations from their intended levels of performance and effectiveness
(PwC, 2007)	the process or technology that is used to constantly review something against expected criteria
Grant Thornton (van Wijngaarden, 2016)	providing up-to-date insight by collecting and storing process information
Protiviti (Verver, 2008)	a process that falls under management's responsibility, in which key business process transactions and controls are constantly assessed
NBA LIO (Doerga, 2015)	processes implemented by management to ensure policy, procedures and primary processes are functioning effectively
Gartner (Caldwell & Proctor, 2009)	a business management monitoring function used to ensure that controls operate as designed and that transactions are processed appropriately

TABLE 2.1: Definitions of Continuous Monitoring

These definitions given in literature show the following keywords:

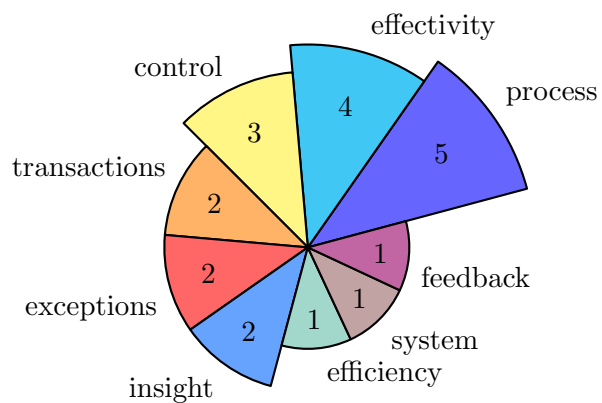| Keyword	Occurence
process	5
effectivity	4
control	3
transactions	2
exceptions	2
insight	2
efficiency	1
system	1
feedback	1

FIGURE 2.1: Keyword table 2.1
Definitions Continuous Monitoring

We see CM is most often explained using the terms process, effectivity and control.

2.1.3 Definitions of Continuous Auditing

The following table shows various definitions on Continuous Auditing, as found in the articles read.

Source	Definition
(CICA & AICPA, 1999)	a methodology that enables auditors to provide assurance on a subject matter using a series of auditor reports issues simultaneously with, or within a short period of time after, the occurrence of the events underlying the subject matter
IIA (Coderre & RCMP, 2005)	a method used to perform control and risk assessments automatically on a more frequent basis
(ISACA, 2002) *based on CICA/AICPA definition*	a methodology or framework that enables auditors (external and internal) to provide written results on the subject matter using one or a series of reports issued simultaneously
(Rezaee et al., 2012)	a comprehensive electronic audit process that enables auditors to provide some degree of assurance on continuous information simultaneously with, or shortly after, the disclosure of the information
(Chan & Vasarhelyi, 2011)	the collection of audit evidence and indicators by an internal auditor on processes, transactions, and controls on a frequent basis
(KPMG, 2008)	the collection of audit evidence and indicators by an auditor on Information Technology (IT) systems, processes, transactions, and controls on a frequent or continuous basis throughout a period
(Deloitte, 2010)	an automated, ongoing process that enables internal audit to continually gather from processes data that supports auditing activities
(PwC, 2007)	*uses IIA definition*
Grant Thornton (van Wijngaarden, 2016)	challenging your accountant to provide assurance in the actuality
Protiviti (Verver, 2008)	audit performs auditing activities on a frequent repeated basis to provide ongoing assurance and more timely insight into risk and control issues
NBA LIO (Doerga, 2015)	a method used by the auditor to execute more frequent automated evaluations of control management and risks
Gartner (Caldwell & Proctor, 2009)	the periodic collection of audit evidence and indicators for the benefit of internal audit

TABLE 2.2: Definitions of Continuous Auditing

The most widely used definition of CM and CA (Flowerday et al., 2006) are the ones used by the American Institute of Certified Public Accountants (AICPA) and the Canadian Institute of Chartered Accountants (CICA), introduced in 1999 (CICA & AICPA, 1999). As these are dominant in scientific literature, we go on seeing these as the most reliable standard definitions.

Where the main keywords in the definitions on CM seem to be process, effectivity and control, we see a stronger focus in the CA definitions on assurance.

2.1.4 Models

Traditional audit remains the standard in the vast majority of firms across the world. Checks are done periodically and the approach is reactive. Therefore, mistakes are identified some time after they have been made, sometimes being too late to correct. Audit checks are done manually, requiring a vast amount of human resources.

Continuous audit focusses on continuously checking records using more automation. Key properties include automatic procedures, automatic analyses as opposed to manual testing, continuous reporting as opposed to periodic, and acting proactively.

The concept of Continuous Auditing has existed for decades. The in 2011 described paradigm (Chan & Vasarhelyi, 2011) defines seven innovation dimensions that enable real-time assurance and enhance the reliability of real-time financial information. The next table compares these dimensions across the Traditional and Continuous approach.

	Traditional auditing	**Continuous Auditing**
Frequency	• Periodic	• Continuous or more frequent
Approach	• Reactive	• Proactive
Procedures	• Manual	• Automated
Work and role of auditors	• Bulk of the work performed is centered around labor and time intensive audit procedures • Independent roles of the internal and external auditor	• Bulk of the work performed is centered around handling exceptions and audit procedures requiring human judgement • External auditor role becomes the certifier of the Continuous Auditing system
Nature, timing, and extent	• Testing consists of analytical review procedures and substantive details testing • Controls testing and detailed testing occur independently • Sampling in testing	• Testing consists of continuous controls monitoring and continuous data assurance • Controls monitoring and detailed testing occur simultaneously • Whole population is considered in testing
Testing	• Humans perform testing	• Data modeling and data analytics are used for monitoring and testing
Reporting	• Periodic	• Continuous or more frequent

TABLE 2.3: Traditional auditing vs. Continuous Auditing methodology, as published by (Chan & Vasarhelyi, 2011)

2.1.5 Continuous Auditing

The CA concept promises higher audit quality and lower costs, therefore interest from audit firms and companies is understandable.

Assessing the level of Continuous Auditing in an organization has proven to be challenging. A tool to assess the adoption level was published ten years ago (Vasarhelyi & Kuenkaikaew, 2008): the *audit maturity model* (or AMM). Describing 4 stages of CA, in order: traditional audit, emerging CA, maturing CA and full CA.

These four stages are compared using seven factors. Firstly, the objective describing the level of financial reports and monitoring internal controls in the organization. Secondly, the approach describing the method, frequency and techniques used for reviewing. Thirdly, IT/data access describing the frequency and level of access to the data/information systems. Fourthly, the level of automation in audit, and the usage of assisting technology. Fifthly, whether the audit department and management share resources. Sixthly, the degree of collaboration between compliance departments including the financial and IT audit. And seventhly, the performance, techniques and description of the analytical methods used by the auditor.

	Stage 1	Stage 2	Stage 3	Stage 4
	Traditional audit	**Emerging**	**Maturing**	**Continuous audit**
Objectives	• Assurance on the financial reports presented by management	• Effective control monitoring	• Verification of the quality of controls and operational results	• Improvements in the quality of data • Creation of a critical meta-control structure
Approach	• Traditional interim and year-end audits	• Traditional approach with some key monitoring processes	• Usage of alarms as evidence • Continuous control monitoring	• Audit by exception
IT/Data access	• Case=by-case basis • Data is captured during the audit process	• Repeating key extractions on cycles	• Systematic monitoring of processes with data capture	• Complete data access • Audit data warehouse, production, finance, benchmarking and error history
Audit automation	• Manual processes & separate IT audit	• Audit management software • Work paper preparation software	• Automated monitoring module • Alarm and follow-up process	• Continuous Monitoring and immediate response • Most of audit automated
Audit and management sharing	• Independent and adversarial	• Independent with some core monitoring shared	• Shared systems and resources with natural process synergies	• Purposeful Parallel systems and common infrastructures
Management of audit function	• Financial organization supervises audit and Matrix to Board of Directors	• Some degree of coordination between the areas of risk, auditing and compliance IT audit works independently	• IA and IT audit coordinate risk management and share automatic audit processes • Auditing links financial data to operational processes	• Centralized and integrated with risk management, compliance and SOX/ layer with external audit.
Analytical methods	• Financial ratios	• Financial ratios at sector level/account level	• KPI level monitoring • Structural continuity equations • Monitoring at transaction level	• Corporate models of the main sectors of the business • Early warning system

TABLE 2.4: AMM as published by (Vasarhelyi & Kuenkaikaew, 2008)

The difference between CA and management tools was researched recently (Alles et al., 2008), finding that the only distinguishing factor is the department using the tools. The use of CA to management has been explained, but the auditor needs to be able to work independently. The Comptroller of the United States, David Walker, has noted that CA will be essential to companies and government.

2.1.6 Expected benefits and limitations

When presenting the AMM ten years ago (Vasarhelyi & Kuenkaikaew, 2008), the writers mentioned most companies are no further than stage 1 or 2, accentuating there is much to gain. They observed an increased amount of ongoing reviews of data, but also identified issues with limited access to data and limited knowledge. Therefore, reducing barriers to reach data can expedite CA implementation (Chan & Vasarhelyi, 2011). The role of auditors will change and IT skills necessary (Byrnes, Brennan, Vasarhelyi, Moon, & Ghosh, 2015; Byrnes, Ames, & Vasarhelyi, 2012), requiring new training. However, as the audit will be faster, a net gain of time can be expected. A powerful expected benefit unmentioned so far, and often overlooked, is that CM can provide security on transactions in ERP and Accounting data systems (Taylor, 2006).

2.1.7   CM/CA in practice

The concept of CA has been widely researched by academics since 1989, and research of actual implementation has been performed in the last decade. We make a clear distinction between academic research, and research performed by firms, as the findings are clearly differing.

The first empirical research was a case study at Siemens in 2006 (Murcia et al., 2008). The researchers investigated 57 articles, of which only one was empirical. As all 56 other articles were all conceptual: defining CA models, theories, and ways to implement, we can conclude that that has had the focus from 1989 through 2006. Since this time, more empirical research has been done.

A survey executed by PwC in 2006 (PwC, 2006), among 392 companies, supposedly all PwC clients, states that a large amount (81 percent) of companies have a CA or CM process implemented or are in the implementation process in the organization. 56 percent reported they had manual and CA processes running.

A year later PwC executed interviews among 72 CAe's (PwC, 2007) of Fortune 500 companies, learning that CAEs expect IT will continue to impact the audit activities in the future. They also recognize that additional IT skills will need to be added to traditional audit skills to understand IT risks in the audit.

A research program undertaken by the Rutgers Business School department CARLAB and KPMG, held in 2011 (Vasarhelyi, Alles, Kuenkaikaew, & Littley, 2012) to obtain a full view of the state of CA, gives us recent information about how companies are in terms of implementing CA. Interesting is to note that Vasarhelyi, who published about CA back in 1991, was also involved. The academics held a micro-analysis and interviewed 38 auditors of 9 major firms about the usefulness and benefits of CA. They conclude that all researches companies were getting to the emerging CA stage in the AMM, so should not be classified as CA. Also noteworthy is that implementation depends on management support and employee knowledge. Staff capabilities in IT and data analytics were often insufficient. Conclusion: CM/CA is still in the initial adoption phase.

A survey held by KPMG in 2010 among 138 Dutch respondents, mostly (60 percent) working for over-billion-euro-revenue companies with backgrounds in Internal Audit, Finance, Risk Management and Compliance, gives us an impression of the state of CA nearby us. Only three percent of respondents reported they had implemented CM/CA, although 25 percent is convinced of the added value. 33 percent reported they expect to have a budget within two years of over half a million euros to implement CM/CA. The major reason to implement CM/CA (50 percent) is the higher security with larger coverage and more depth.

The number of implementations of CA by external auditors has barely increased, due to the sensitive data involved (Byrnes et al., 2012). What has increased is farming out of the internal audit. To implement CA different skills are required, namely in audit, data analysis and programming. As CM/CA is not utilized to its full potential, much is yet to be achieved.

2.1.8 Variability in literature

We'd like to discuss how consequent the various definitions in the literature are. We noticed one important factor on the definition of Continuous Auditing. The term CA has been misused on several occasions. As the firm-executed survey (PwC, 2007) is in contrast with the academic research (Vasarhelyi et al., 2012), it may be an indication that audit firms benefit from showing they have a high number of implementation of full Continuous Auditing, while from an academic perception the implementation is in an early phase. The definition of CA has been changed by every audit firm, making use of the term somewhat arbitrary. This high adoption rate was influenced by the fact quarterly and monthly manual audits were considered CA. The loosest term of Continuous Auditing is that the audit is done "more frequently", so we conclude that even just more than one audit check per year can be called CA by some.

2.2 Problem Outline

Traditionally, the public sector has followed the private sector, adapting and implementing tools developed in the manufacturing sector (Fryer, Antony, & Douglas, 2007). Whether the CA-paradigm is equally useful for public and private sector is uncertain, as it is particularly interesting for industrial firms with high risk business processes (Chan & Vasarhelyi, 2011). However, we see value in research on whether CA can be (cost-)effective for public sector as well, as the promised benefits describe features every organization has. A recent study comparing the audit functions in private and public organizations concludes that the activities and interactions are similar (Goodwin, 2004).

Academic research in combination with experimentation by practitioners is needed to support a proper evolution of CA (Chiu, Liu, & Vasarhelyi, 2014). But limited research is available as of yet on how Continuous Auditing should be applied in the public sector, and what the effects on its running processes are. Audits in the public sector differ from private sector, due to other responsibilities within the organization.

Still, there is little evidence that the actual level of implementation is high. Empirical research, to measure actual impact, is still limited. In 2002 there were little if any examples of reporting on a continuous basis (ISACA, 2002).

2.3   Research Questions

The main research question of this thesis reads as follows:

- *What are the lessons learned in implementing Continuous Auditing in the private sector, that are applicable to the public sector?*

To answer this, we have defined three supporting questions.

1. *What is the current state of the auditing process in the public sector?*

2. *What are examples in private sector organizations to measure the impact of CM/CA?*

3. *What could a more efficient auditing process in the public sector look like and how could it be implemented?*

2.4   Objective and Relevance

The aim of this research is to provide business controllers and financial auditors an overview on how applying data-analysis in the financial organization impacts the organization. We will investigate leading models on how data-analysis could be implemented, and look at actual results.

As empirical research is limited, we are keen to discover what the actual benefits of the Continuous Monitoring and auditing paradigm are. We will investigate whether these benefits are broadly applicable, if it is the right method, as well as key differences between public and private sector.

Considering the issues just laid out in the Problem Outline, and including the fact that there is to date no clear and proven best practice, implementation of CM/CA remains an uncertain project. We believe that gathering proven best practices would provide the reliability needed. Our research findings will seek to contribute to the state of academic research, by putting forward an overview useful to financial business controllers of public sector organizations.

As the relevance of this research has been brought forward in this chapter, we continue by reviewing literature in this field. This includes conceptual and empirical scientific research, and as non-scientific material is often used within organizations, those will be reviewed as well.

Chapter 3

Methodology

Answering our research question relies on using lessons learned and examples in practice. As outlined in the previous chapter, empirical research is limited. This is especially the case in the last few years, and particularly in public sector organizations, so we need to collect experiences ourselves. Therefore, our method of choice is to perform a multiple case study. We expect that holding interviews will generate the most reliable and in-depth results. Surveys have limitations, generating more superficial results. This chosen method enables us to ask follow-up questions bringing depth to the findings of our assessment. As establishing priorities is a goal of our exploratory research, interviews are most suitable. After, we can explore the differences between different organizations and replicate findings about how CM/CA can be implemented.

Our research phases can be defined as follows: defining interview guide, inviting participants, conducting interviews, coding results, analyzing results.

3.1   Research approach

Participants will be found by utilizing our network: the supervisors, and the financial department of our university. We have focussed on controllers and auditors, or other relevant positions, involved in a project moving towards CM or CA. The interviewed participants from Dutch companies and organizations should give a sufficient view of the state of CM/CA, as several are operating globally. We expect to gather first or second hand experience in this field, across public and private sector.

The interview guide used has been added as Appendix A.

3.1.1 Analysis

The interviews are then transcribed and translated. The results are coded, by either picking out keywords, or by interpreting emphases. These results from all participants are then aggregated in a large spreadsheet, allowing comparison and interpretation. Derived tables and relevant graphs are used to visualize the results, showing how many times which result has been generated. After presenting these results in tables and charts, we subsequently comment on them.

Considering the lessons learned in the private sector, and available literature, we will present recommendations to consider when implementing changed towards a more continuous audit in the public sector. We will consider whether Continuous Auditing is always the ideal situation, and how the processes in the organization would change. What is the expected benefit, and how can a public sector financial department be moved towards that situation?

To evaluate the maturity of CA we categorize the status of the organizations using the AMM (audit maturity model), as shown in table 2.4.

Chapter 4

Results

In order to gather the lessons learned in implementing CM/CA, we continue by conducting the interviews. Special attention is paid to comparing public and private sector, in accordance with our problem outline.

The questions in the interview guide (appendix A) are divided into four categories which define the results structure, namely: background, definitions, challenges, and processes. The results on the Background of the organizations have been included in Table 4.1, assuring anonymization. For the sections on Definitions and Challenges, we interpret emphases tables to compare participants' answers, while the results of the Processes category will be visualized in graphs

4.1   Background of participants

A total of eighteen people with experience on moving towards CM/CA have been interviewed throughout the research. Anonymization has been conducted by coding names of participants and organizations, and generalizing company-specific role titles. The interviews took place in the period from September 30th, 2016 till January 17th, 2017.

Organization Code	Industry	Participant Code	Role	Level	Date of Interview
A	Education	1	Internal Audit	Director	26-10-2016
B	Education	2	IT	Manager	02-11-2016
B		3	Finance	Director	08-11-2016
C	Education	4	IT / Finance	Manager	24-11-2016
D	Government	5	Internal Audit	Manager	22-11-2016
E	Energy	6	Internal Audit	Director	10-11-2016
F	Banking	7	Internal IT Audit	Senior	01-12-2016
F		8	Internal Audit / Data	Analyst	06-12-2016
G	Electronics	9	Finance	Director	08-12-2016
H	Beverage	10	Internal Audit	Manager	20-12-2016
I	Accounting	11	IT / Finance	Manager	30-09-2016
I		12	IT	Manager	16-01-2017
I		13	Accountant	Partner	17-01-2017
J	Accounting	14	External Audit	Director	11-10-2016
J		15	IT	Partner	06-12-2016
K	Accounting	16	External Audit	Manager	18-10-2016
K		17	IT	Partner	06-12-2016
K		18	IT	Consultant	17-11-2016

TABLE 4.1: Case participants and organizations

The organizations in education, government, energy, banking, electronics and beverage have first-hand experience, while the accounting/advisory firms gained their experience from projects enacted at their clients. We define experience as first-hand when the interviewee himself has been member of a team on moving towards CM/CA within their own organization. Taking this factor into account, we distinguish advisory firms from the other private sector organizations, creating three types of organizations: public, private, and advisory. Notice that we decided to interview participants with an advisory background about their second-hand experiences, as each advisory participant indicated their external experiences regarding CM/CA were more comprehensive than their experience within their organization.

The category public sector consists of six participants from three institutes of education *A*, *B* and *C*, and one department of government *D*. We categorize the five interviewees from four large companies *E*, *F*, *G* and *H*, each from a different industry, as private sector. The third category comprises eight participants from three *Big Four* accounting and advisory firms, *I*, *J* and *K*.

4.1.1 Processing

A total of eighteen interviews were held, resulting in 1121 minutes of recorded audio, an average of 62 minutes per interview. All interviews were transcribed, and the results were then formatted to enable further analysis.

We have chosen not to triangulate the data by merging the answers from different participants from the same organization, as we see significant differences in background, department and answers given. On several questions we interpret emphases, and analyze if the participants' show apparent differences. We pay special attention to whether the differences may be related to the participant's industry background as described in Table 4.1. Subsequently, processes drawn by participants are digitized.

All asked questions can be found in the added interview guide A. If tables or graphs are used to present the answers given, the amount of participants that answered that questions will be mentioned. As not all participants answered each question, not all will say *"18 respondents"*. Questions that did not generate usable results will not be discussed or visualized. In addition to showing the results in tables, results may be visualised.

4.2 Definitions

We asked the interview participants to describe their understanding of the terms *Continuous Monitoring* and *Continuous Auditing*, in order to get an understanding in practice. This prevents ambiguity as we already noticed the existence of vastly different definitions earlier.

In order to further compare the results, we interpreted emphases from the answers, and counted their occurrences. The multiple-occurring emphases will be looked at to conclude general trends. A single emphasis will not be counted more than once per answer: *maximum number of counts per respondent = 1*, where a respondent is a participant who answered the concerning question.

The following tables present the occurrences of keywords participants used to define CM and CA. Exact results can be found in appendix B for Continuous Monitoring, and appendix C for Continuous Auditing.

4.2.1 A3: Continuous Monitoring

Keyword	Occurrences
exceptions	8
processes	8
controls	6
data analysis	5
being in control	3
follow-up	3
transactions	2
efficiency	2
effectivity	2
system	1
integrity	1
risk	1
periodic	1
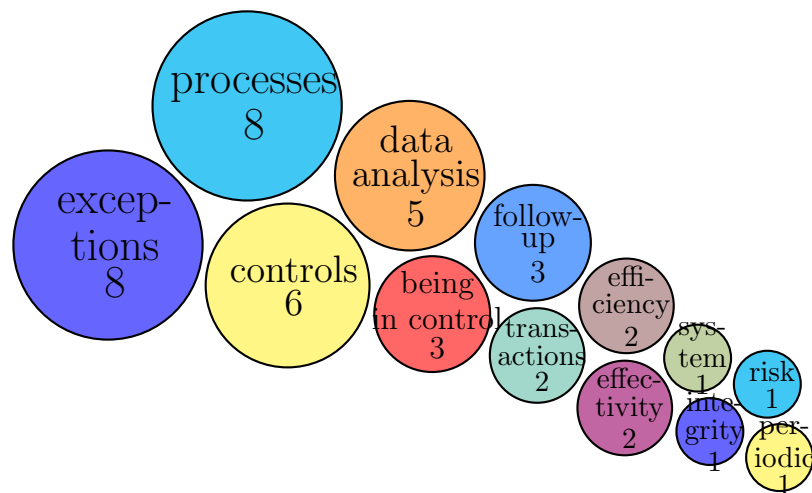
FIGURE 4.1: Question A3, 18 respondents
"How would you explain what Continuous Monitoring is?"

Where we felt several words were used to refer to the same subject, they were grouped together, generating a less diffused occurrences table. As an example: the words *anomalies* and *inadequacies* were included in the emphasis *exceptions*. Consequently, we see this emphasis occurs relatively often. This emphases, *exceptions*, occurs most often, together

with *processes*. Six participants associate CM to the use of controls, and five to using data analysis.

4.2.2 A4: Continuous Auditing

The merely once occurring instances are not visualized in the graph to improve formatting, as they are numerous. The following table shows the keywords interpreted from the results, which can be found in appendix C.

Keyword	Occurrences
assurance	8
CM-dependent	7
processes	4
controls	4
data analysis	3
follow-up	2
large scale	1
compliance	1
efficiency	1
continuous data collection	1
grip	1
audit finding	1
periodically	1
approval	1
risk	1
monitoring	1
supervision	1
exceptions	1
system	1
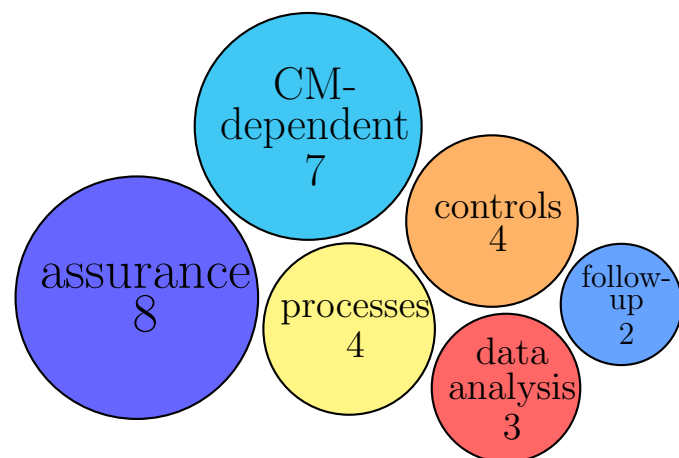
FIGURE 4.2: Question A4, 17 respondents
"How would you explain what Continuous Auditing is?"

The two most occurring terms are *assurance* and *CM-dependent*. Many respondents referred to CM when explaining CA, and implied CA is the 'next step' and requires CM. This implication is made explicit by participant 12 using the phrase "leaning on existing CM system" to define CA, and even more so by participant 9, stating CA "can only be after CM." We see that there is a general tendency to first implement CM, before applying the methodology in the higher audit level of the organization. We do notice that there was one exception to this general trend; the answer of participant 8, stating it makes more sense to build data analysis tools at the auditors request first, and then implement them at a lower level in the business.

The most occurring term though, assurance, matches the auditors' responsibilities. According to the IIA, "internal auditing is an independent, objective assurance and consulting activity" (IIA, 2013), and defines assurance as one of the core elements of value delivered by internal auditing. This assurance responsibility stated by the IIA, matches the importance our participants show. We conclude the responsibility to provide assurance defines a key attribute of CA.

Across the table, definitions between the three industry sectors (public, private and advisory) seem to resemble each other. The two most occurring keywords are mentioned by participants from all three industry categories.

4.3 Decision

This section describes the results aimed towards understanding how and why the decision was made to move towards CM/CA.

4.3.1 B3: Reasons to start

Emphases	Occurrences
inefficiency	7
being in control	5
reducing costs	4
presence of errors	3
compliance	2
reducing workload	2
higher assurance	2
scandal	1
technical possibility	1
fraud prevention	1
inspired by others	1
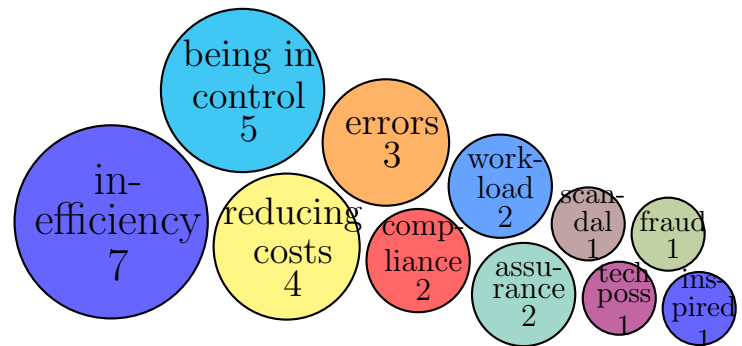
FIGURE 4.3: Question B3, 14 respondents
"What were the reasons to start with the transition towards CM/CA?"

Presence of inefficiency in the current activities stands out as the most frequently mentioned reason to start. For instance, participant 10 sees these inefficient processes causing major disadvantages in their organization, including annoyed employees and financial losses. The second-most occurring emphasis is that CM/CA is necessary to be in control, participants 2 and 15 explained they need better insight to manage the business processes.

The third-most occurring reason, reducing costs, was only mentioned by individuals working at private sector and advisory institutions, indicating an emphasis on return on investment.

4.3.2 B5: Scope and goal

"What was the final goal of this project, and would you consider the scope CM or CA?"

All respondents explained a scope corresponding to their personal role. Auditors focus on CA, or on a form of CA that is supported by CM at departments of clients. Multiple auditors describe a scope of a "fully IT-driven control approach" that "leans on the CM-processes and systems of the client".

The non-auditor participants, working within financial departments, highlighted the relevance of CM for their department. As one control manager stated "CA is considered external, so out of scope". The broadest scopes emphasize the value of implementing CM organization-wide, so in more departments than just financial.

Participant 3 underscored it usually depends on the role of the initiator within the organization. Where the head of internal audit is initiator, the goal is often CA, whereas it is CM when a financial controller or manager initiates it.

4.3.3 B7: Expected benefits

Emphases	Occurrences
quality increase	12
process efficiency increase	6
cost decrease	5
workload decrease	4
timeliness increase	3
errors decrease	2
control increase	2
safety increase	1
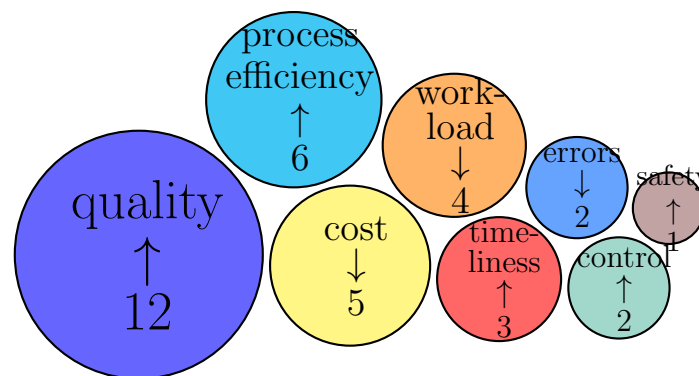
FIGURE 4.4: Question B7, n=16 respondents
"What were the most important expected benefits of the CM/CA-transition project?"

The qualitative benefits of CM/CA was clearly most mentioned, described by twelve out of sixteen participants that answered this question. Quality was described as "an increase in reliability of numbers" (participant 2), and a way to "look at more data than a sample can provide" (participant 17). As participant 15 put it quite simply: "Better data supports better decision making". We see managers explain they need better quality "to be more in

control" (participant 8), whereas auditors mention "looking at fragmented sample data does not suffice anymore" (participant 18), indicating an underlying need to add value.

4.3.4   B8: Support measures

Emphases	Occurrences
motivating low-level employees	6
leveraging high-level support	5
defining responsibilities	2
communicating business case	1
communicating technical easy-of-use	1
performing deep research in processes	1

TABLE 4.2: Question B8, 13 respondents
"Which measures were taken to gain support for the transition within the organization?"

When asked about the measures taken to gain support for the transition, we see most participants either emphasized the necessity of building support on either a low or high level in the organization, which is almost equally divided. Only a single participant focussed on both levels.
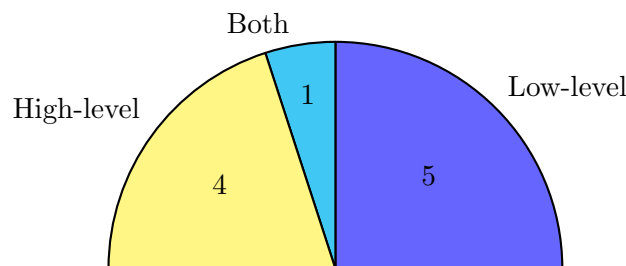
FIGURE 4.5: Emphasis on level of necessary support

4.4   Challenges

4.4.1   D1: Domains changed

Almost all participants named the financial department. Participant 11 explains this due to the fact CM/CA is particularly useful in domains with data-driven processes with many transactions.

Five participants, all with experience in the public sector, gave the same answer: "first finance, then HR". In other words: every time HR was mentioned it was specified that the financial department would be subject to changes first.

Keyword	Occurrences
Finance	13
HR	5
Internal Audit	3
Supply Chain	3
IT	3
Sales	1

FIGURE 4.6: Question D1, 15 respondents
"Which domains of the organization are subject to the change towards CM/CA?"

Other named departments were internal audit, supply chain, IT and Sales, but no participants mentioned they had made any progress outside of the financial domain.

4.4.2 D4: Realized benefits

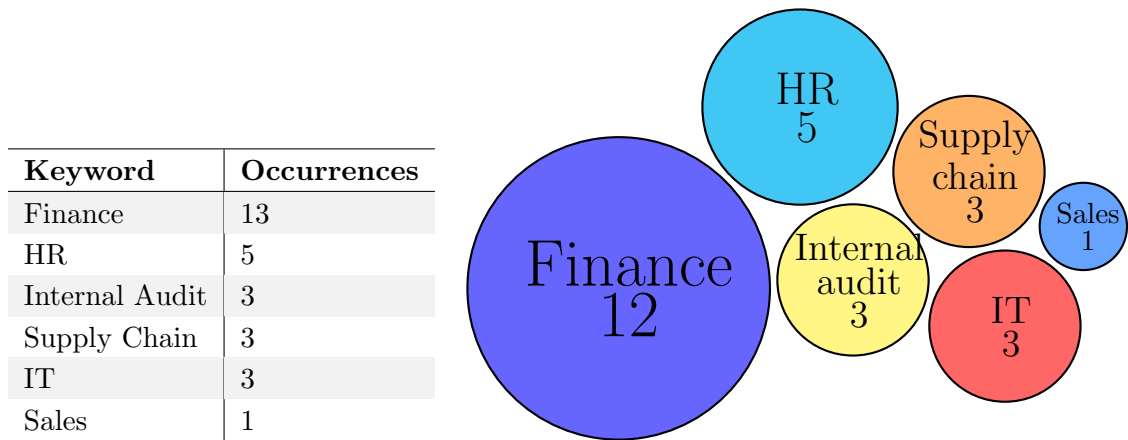| Emphasis	Occurrences
Quality increase	6
Efficiency increase	4
Mutual understanding	3
Uncertain	1
Clear path to goal	1
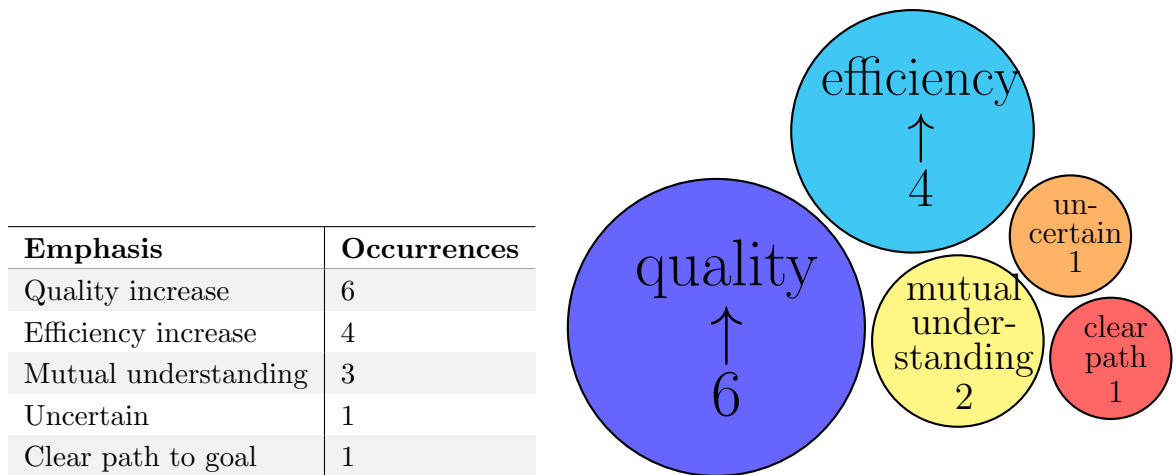
FIGURE 4.7: Question D4, 12 respondents
"Which realized benefits do you see now?"

Most respondents explained quality factors that improved, caused by increased completeness of used data. Keywords used to describe this include *more insights generated*, *better data integrity*, *more assurance that entered data is correct*, *more specific data used*, *less dependent on limited samples*, and *less doubles*.

The increase in efficiency is explained as better timeliness, causing reduced cost. In this context, timeliness implies a lower throughput time. This is the result of automating data

analysis, limiting the time spent for manual work. Keywords include *work faster done*, *better productivity*, and *less time spent fixing errors*. One respondent stressed that any step in moving towards CM/CA cannot bring either a quality or an efficiency, but will always do both. In practice, CM/CA is used to reduce errors: creating more valuable data, and removing time spent to fix them.

Four participants, none of them mentioning quality of efficiency increase, explained they didn't have any concrete realized benefits yet, as they are still in an early phase of implementation. Whereas participants from organizations that are further in implementation focussed on quantifiable measures, three of these participants focussed on soft values. These explained a cultural change where the value of mutual understanding between departments was created. More consideration on the impact of each others work paves the way for growth.

4.4.3 D5: Enablers

We group the mentioned organization components enabling CM/CA in three categories using the PPT (People Process Technology) model, which are the three major components in an organization identified as the key to process improvement (Prodan, Prodan, & Purcarea, 2015). This model is based on Leavitt's Diamond Model, while combining 'tasks and structure' in the 'process' category, creating three fields. In this process category, governance and strategic issues will be included. The following table counts the major organization components described by the respondents.

Main component	No. of participants
People	11
Process	8
Technology	7
Urgency	7
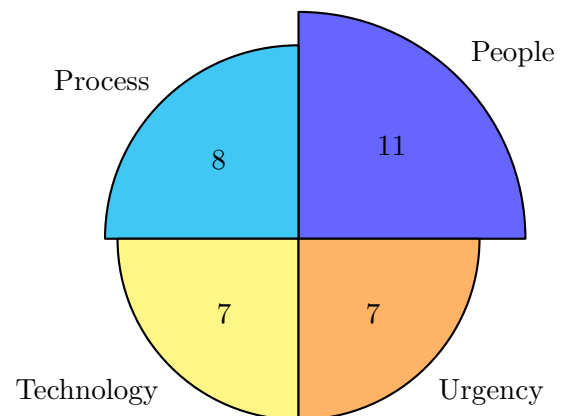
FIGURE 4.8: Question D5, 16 respondents
"What were the enablers of movings towards CM/CA?"

As one term, urgency, was mentioned quite often we chose not to categorize it under one of the categories. Only when a participant mentioned a direct urgency to change, it was included in the fourth *Urgency* category. Where a participant describes "seeing potential to change" it was categorized under the *People* category. All major (PPT) components are represented in the answers.

The following charts subcategorize the answers given. For these visual charts, the *maximum number of counts per participant = 1* is applied per *sub*-component.

FIGURE 4.9: Enabler Subcomponents of People, 11 respondents

The most-often subcomponent mentioned was willingness at the top, where management saw the potential of change. Others explained the business culture, where people at the business level unders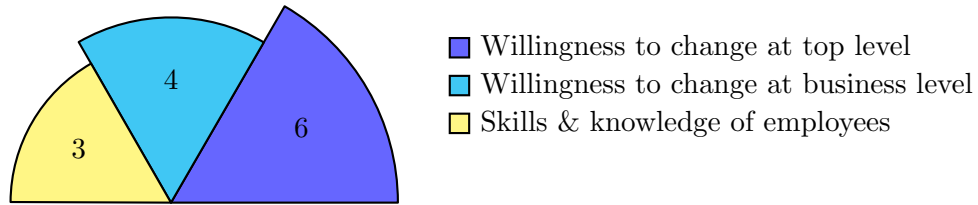tood the vision and were onboard, was a critical driver. Only three participants explained the need for having personnel with knowledge and experience in this field. All of these participants stressed how difficult it was to acquire IT personnel capable of extracting and understanding their data.
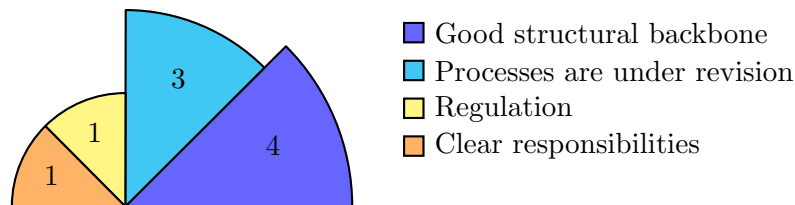
FIGURE 4.10: Enabler Subcomponents of Processes, 8 respondents

Several respondents explained the fact they already had a reliable set of business processes, enabled them to build upon it. Three others recognized this as well, while they didn't have the backbone in place yet, but were in the process of revising them. Only respondent 2 named new regulation as a driver in needing to have more reliable day-to-day figures to ensure compliance.
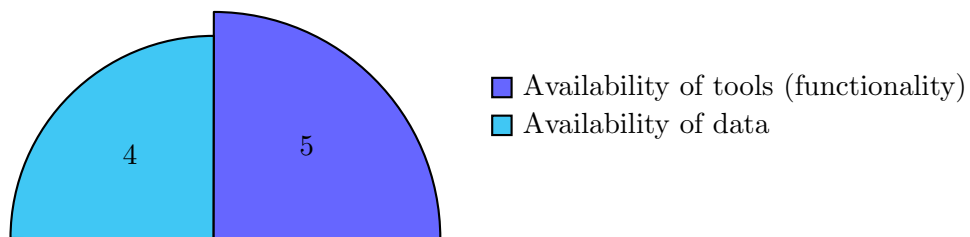
FIGURE 4.11: Enabler Subcomponents of Technology, 7 respondents

Five participants mentioned how having the right IT system and tools enabled their change. New CM-technology enables the organization to connect data that could not have been done so manually, according to participant 2.

When the word urgency was used, most often the participant described the presence of errors the organization needed to fix according to internal members of the organization. Participant
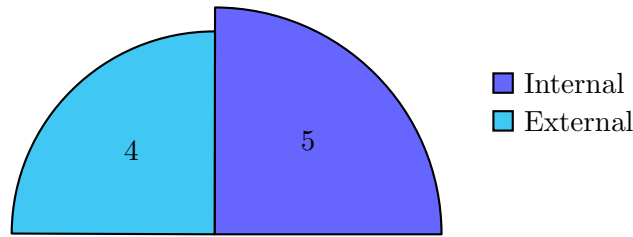
FIGURE 4.12: Enabler Subcomponents of Urgency, 7 respondents

14 and 16 explain business managers indicated they could not execute their responsibilities with certainty in the old situation.

Urgency providing pressure change coming from an external factor was named almost as often as from an internal factor. External factors were different per organization, and are broken-down into: a scandal, a disapproving auditor, a refused subsidy, and a low market price of the product driving inefficiency cuts.

4.4.4   D6: Hurdles

We use the three categories from the *PPT*-model to group the results in identified hurdles too. The following table shows the main organization components hurdling CM/CA.

| Main component	No. of participants
People	12
Process	7
Technology	8
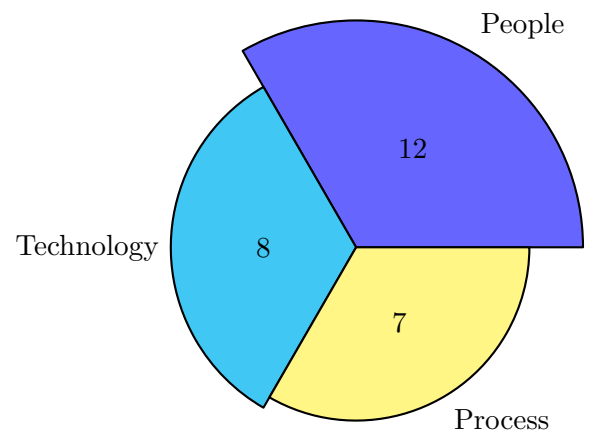
FIGURE 4.13: Question D6, 15 respondents
"What were the hurdles of movings towards CM/CA?"

Where urgency was often named as an enabler, it was not described as a hurdle, causing all answers to fall within the original *PPT*-categories. Issues on the people-component of the organization were most often mentioned, and usually given as the first and foremost hurdle. Still, on the technology and process side of the business, issues were hindering as well.

The major hurdle seems to be a negative mindset of employees from the start. Seven respondents explained the difficulty of gathering support and commitment from the employees subject to changes. Described as a resistance for having new responsibilities, as named by
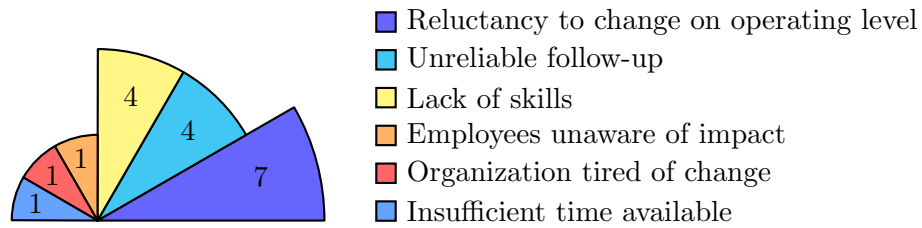
FIGURE 4.14: Hurdle Subcomponents of People, 12 respondents

participant 16 can be a factor, where participant 10 underlines that employees don't want to be checked more and lose control at the same time. Four respondents discussed uncertainty whether the new process would actually be followed by employees. Four others focussed on a lack of skills: participant 2 names IT, Financial control and Audit skills as all needed to build the right solution.
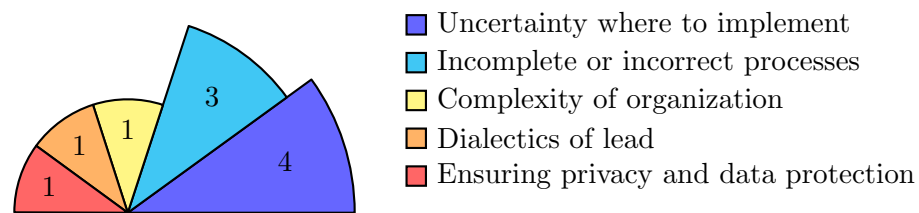
FIGURE 4.15: Hurdle Subcomponents of Process, 7 respondents

Selecting which controls need to be implemented, i.e. which data elements are valuable and suitable for the tool used, was named four times. Three times mentioned was, the lack of the most often named *Process* enabler, an incomplete or unreliable structure of processes in place to build in. Only one respondent, working with large multinational corporations named organization complexity as a hurdle.
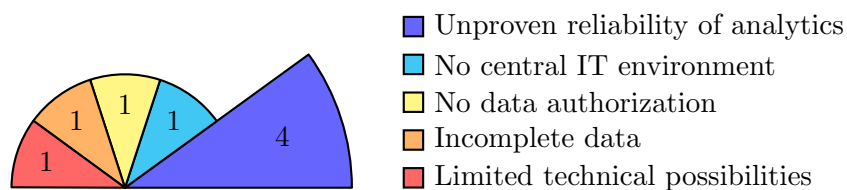
FIGURE 4.16: Hurdle Subcomponents of Technology, 8 respondents

Although having a negative influence to the motivation of daily operations, the unproven reliability of analytics is a technical factor. Named four times, new tools have to be reliable in order to be implemented successfully.
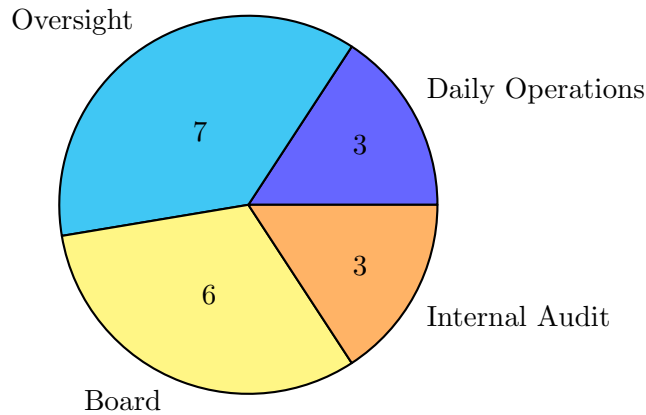
FIGURE 4.17: Question D7, 10 respondents
"Which persons involved in this transition, were key to the successes made?"

4.4.5 D7: Supporting persons

We categorize the results in four categories based on organization level: Daily operations, Oversight functions (controllers), the Board of directors or Top-level, and the Internal audit department. A top-down approach occurs seems to occur often, as higher level functions are considered most important to make sure success is reached. Commitment from the top seems to be necessary to make large changes possible. Although the lower level was mentioned multiple times in the previous question on hurdles, only one respondent described an equal importance of involvement in all levels: a board backing the plan, oversight functions fueling the change, and daily operations feeling involved and responsible.

4.4.6 D8: Maturity

Based on our own assessment on the answers given by the participant, we categorize them based on the Audit Maturity Model, or AMM, as explained in the Literature chapter 2 in table 2.4. These levels are (*Traditional*, *Emerging*, *Maturing* and *Continuous*). Please be reminded, for advisory roles, the level of maturity of the project discussed is assessed. Where multiple participants gained their experience from the same project, doubles were omitted, creating 18 instances.

All organizations with first-hand experience are assessed as *Emerging*, as they have some key monitoring processes implemented. Even though the effectiveness of these may be limited, we can not categorize these as mainly manual. All participants with an advisory or auditors' role in the private sector also described environments that we categorize as Emerging. Adding one participant with an advisory role in the public sector, we have 14 *Emerging* environments.
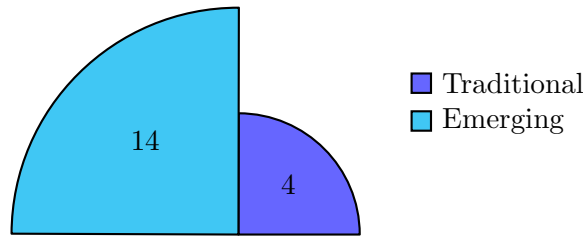
FIGURE 4.18: Question D8, 18 instances
"How mature would you consider the status of CM/CA in the organization?"

Four environments are assesses as *Traditional*, all described by participants with an advisory role in the public sector. All described projects that were concerned with the planning phase of a more continuous environment. Creating clarity in processes and underlying responsibilities, together with limited examples, are named as the primary reason these organizations are in the "baby phase" as participant 1 called it.

4.5 Processes

All analyzed processes are included in appendix D.

4.5.1 Purchase-to-Pay

The *purchase-to-pay*-process (or *P2P-process*), part of the *procure-to-pay*-process, is one of the core business processes used in ERP systems (Okrent & Vokurka, 2004).

4.5.1.1 Common standard

We compare the sketches drawn by the participants to commonly used standards. We consider APQC and SAP as authorities. Comparing the P2P-process standard, the core of the process becomes quite clear. For easy comparison, the abbreviated name of the step is included.
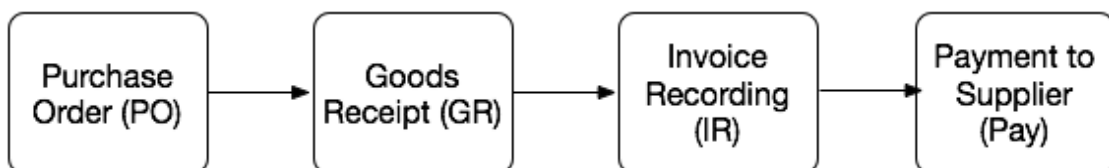
FIGURE 4.19: SAP-Fi, abridged, via Finomics by Indore Business School

We assume the SAP-Fi version as the standard P2P process.
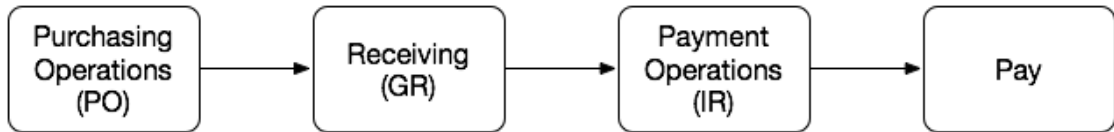
FIGURE 4.20: APQC, Jess Schreer
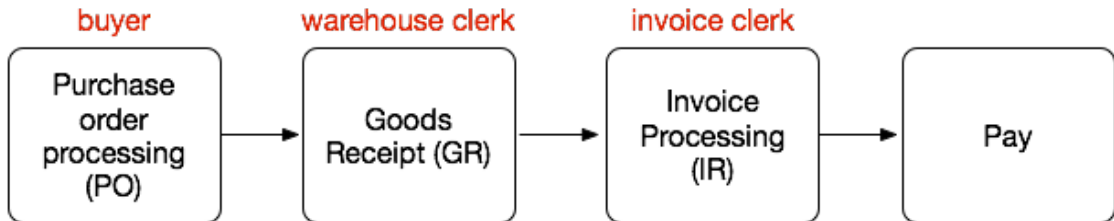
FIGURE 4.21: SAP ES Bundle

4.5.1.2 Participant sketches

We start by looking at this process, as five interview participants explained they had experience with implementing CM/CA in this particular process. Often this was named as a relatively easily implementable process, as the standard process is clear.

Although all five Purchase-to-Pay processes are drawn quite differently by the participants, thus look distinct, all processes are essentially equal. We see no reason to interpret these dissimilarities as valuable outcome. We do see differences in how Continuous Monitoring is implemented in the process, which we focus on.

In two given processes, the second and fourth, the process is essentially unchanged and Continuous Monitoring only automates tasks that were previously done manually. This automation is essentially checking whether authorizations were done correctly.

In one case, the first, the CM system has the direct option to block payments in case a duplicate invoice was recognized, thus being an additional step in the process.

The third and fifth Purchase-to-Pay processes, both given by auditors, drew CM as a system next to the main financial system, which finds instances not following the happy flow and reports these exceptions to management.

4.5.2 Payroll

The payroll process, used by employees to write their hours and request salary payout, is also subject to changed by CM at three interviewed organizations. In all cases CM is used to check the completeness and correctness of the master data. The first sketch is a single added check: assessing the validity of the information entered in the first step. The second sketch

performs a check later in the process, by comparing several parameters to calculate timeliness and completeness. The third sketch eliminates a manual check by adding a different way of preventing fraud, namely a data analysis across two systems.

Chapter 5

Discussion

This chapter will be used to discuss the results as laid out in the previous chapter. First, the definitions participants used to describe CM/CA are compared to the results of our literature study. We proceed by discussing the findings on changes made within participants' organizations. As our research question is *What are the lessons learned in implementing Continuous Auditing in the private sector, that are applicable to the public sector?*, differences and similarities between the sectors are pointed out.

5.1 CM/CA, what is it about?

5.1.1 Term usage in practice

Before performing our interviews, we kept in mind that the participants may be accustomed to a definition with a considerably different basis. The answers of the interviewees show differences in emphases. While one respondent described CM as being a "data analytics system", another called CM "a process". Also, the first word of CM: continuous, is up for discussion. The respondents described continuous from being fully continuous or real-time, to being "as continuous as necessary", the latter meaning up to once per quarter (according to that participant). This dilutes the term, as the word *continuous* is should only be used to describe the opposite of *periodic* (Merriam Webster, 2017).

It is conspicuous that many respondents only focused on the checking or analyzing of data or transactions when describing the term CM. Other respondents did acknowledge this part, describing CM as a much larger paradigm, and describing the reorganizing of the processes in the organization as an equally important part. Another difference in terminology used by participants, showed when a respondent use the term "data analytics" (or data analysis) a lot, while others don't use that term but may mean the same.

On the CA definitions, we see three of the most prominent emphases that were used to describe CM were used as well. Namely *processes*, *controls* and *data analysis* are still found multiple times. This shows these terms are associated with both CM and CA.

In our interview guide, questions regarding how the interviewee interprets the terms CM and CA were asked before going into detail. Reviewing the large differences in interpretations, this has proven to be an important preliminary step in my research, and should be followed by others when discussing this subject.

5.1.2 Further emphases examination

To avoid confusion in comparing emphases, we noted a difference between 'control' and 'controls'. The term 'control' is used as 'being in control', a state managements want to be in. The term 'controls' is often used from a risk management perspective, and can be described as the means by which an organization's resources are directed, monitored and measured (B-Corporation, 2011). Also striking was that a number of respondents already specified in their definition that CM is done by "the client", "the business" or "management". Others did not include this, therefore may accept situations where the analyses are done externally as being CM.

A number of respondents limited the possibilities of CM to the financial domain, as they did not speak about organization-wide terms as "data" or "controls", but about "transactions", a term more often used in the financial domain. On the other hand, one of the other interviewees in the private sector was keen to focus on the organization-wide possibilities CM offers. We should note that the term transactions is also used in the IT-environment, namely in database management, and therefore does not prove limitation to the financial domain by the interviewees concerned.

Whether these differences 'prove' differences in interpretations of the term CM can not be said with high certainty, as we acknowledge they may be colored by the projects the respondents are working on. However, it does show a difference in mindset that is important to acknowledge to avoid miscommunication.

5.1.3 Comparing to literature

Asking the participants for a definition of CM, the keywords *data analysis* and *controls* occurred most often. And indeed, when comparing these emphases to the keywords found in the literature, we see *data analysis* is not an emphases of any of the main definitions. This shows an essential difference in how literature and respondents look at Continuous

Monitoring: the respondents are focused on which techniques need to be implemented to get results, whereas literature pays more attention to the abstract paradigm. We also see that CM in practice is more focussed on the practical goal of fixing exceptions, where literature does not define CM this way as often. Other emphases, including *controls* are quite evenly represented on both sides, showing thinking in controls is common in this domain.

On CA the focus on assurance was apparent. The answers were divided on whether CA was described as a separate term, or dependent on CM. Several participants explained CA would only be possible after CM was running, or see CA as a tool to check CM with (participant 5). Others, often auditors themselves, focussed more on the benefit CA promises that it can help audit more data. A large difference comparing these results to the definitions in literature, is the fact no literature definitions described this dependency on CM.

5.2 Deciding to change

5.2.1 Reasons to start

One in two participants name inefficiency as a reason to start. This implies there is still much to improve in financial processes in practice. This combined with the the five-times outspoken need to become in control, and the three-times mentioned presence of errors, makes the image move towards a more urgent situation, where change is quite simply necessary. Considering that not being fully in control, and the presence of errors seems to be omnivalent, we are glad to see organizations moving forward and learning using new techniques. One reason, though only mentioned once, which is the *scandal* reason, drew our attention too. It was given by a public sector participant, and suggests that the fear of a scandal is larger than fear of profit reduction in the public sector institutions. In addition to the fact that *reducing costs* was only mentioned by private sector participants, we saw this as a typical example of how public sector differs from private in a number of factors.

5.2.2 Scope and goal

The results to question B5 show how much the scope and goal of a project relies on the people involved, as Participant 3 noted correctly. Where the project was initiated by a business controller for example, the focus was on reaching CM, whereas an auditor is focussed on reaching CA. This makes sense of course, as CM is associated with increased control for better decision making, and CA is focussed on assurance. Participant 15, clearly not an auditor, simply said "CA is considered external, so out of scope".

Although we understand the need of a person driving the project, and how this person's role influences the project's goal, we note that this can be considered a missed opportunity. As CM and CA are mainly different in the level they operate, the tools used can often be used for both.

This highlights a vicious circle we observed. A business controller wanting to work towards CA finds an auditor with limited experience, and an auditor wanting to work towards CM finds clients tentative to move towards a new paradigm. We believe this phenomenon is a main reason CM/CA implementation is lagging. In line with this, the seemingly successful projects we found are projects where the organization and auditor are both involved.

5.2.3 Expected benefits

CM/CA can be seen as a typical automation paradigm. In the media this is often associated with cost reduction. 5 out of 16 participants mentioned this motive in answering this question. Increasing the quality of data or improving decision making seams to be the main reason here, as most participants only named qualitative motives.

We note it's striking that the last interviewed participant called 'making processes more lean' as an expected benefit of CM. We argue implementing CM is almost always the addition of checks, making a process more complex, rather than leaner. Literature also suggests accounting information systems generally add complexity and risk (van der Aalst, Van Hee, & van der Werf, 2010; Kiesow, Zarvic, & Thomas, 2014). We suspect that in the case of this participant, implementing CM was used as an incentive to overhaul outdated processes, which does not necessarily decrease complexity per se, but should improve needed efficacy.

5.2.4 Support measures

Several participants focus on getting low-level employees on board to generate support, stressing how important this is. Participant 2 mentions they made sure to take small steps to avoid a giant leap in the mindset of employees, and participant 5 explains how taking the time to show employees how it makes their tasks easier was necessary to gain support. These participants observe a risk of having low-level employees feel uninvolved, possibly jeopardizing the project. The four participants that did not mention low-level employees at all during the interview may be overlooking this observed risk. One participant admitted to setting this risk aside on purpose, as it would be too time consuming to mitigate it. Organizations should be aware of this risk, and assess the significance for their situation.

5.3 Challenges in adoption

5.3.1 Domains changed

That the financial domain plays a strong role in this subject is no news, as assessing financial statements is a key responsibility of the audit sector. Also, the financial domain, encompassing a great deal of text data, makes it relatively suitable for automation.

The "first finance, then HR" pattern, on the chosen order of implementation, indicates a similar strategy and perspective on CM/CA in the public sector in the Netherlands. This could be explained by close contact between the financial managers interviewed. The interest in HR may be caused by the view that the institutions of education view the payroll process as a major expenditure.

5.3.2 Realized benefits

These realized benefits observed correspond to the expected benefits described in question B7. As our interviews were not held before and after changes were made, we do not find differences between the expected and realized benefits answered.

5.3.3 Enablers

We chose to categorize Urgency separately to show how often this was a large driver. In reality, the number of instances may have been larger, as it may be so that a number of participants chose to present the negative business case (having to remove errors) as a positive business case ("seeing the possibilities of change"). If we assume that is the case, the presence of errors may be even more ubiquitous than the raw data suggests. Nevertheless, we can conclude all factors, people, process, technology and urgency, are possible change enablers.

5.3.4 Hurdles

We noted that a number of the hurdles we found are inherent to change management, many of which seem to be typical for CM/CA. The most often named hurdle, after all, was reluctancy to change of employees at the operational level. Mind, moving towards CM/CA does bring factors inherently increasing oversight on employee's work. Although not named, we also point out that generally any automation project causes a decrease in workload which may mean lay-offs. We realize that may include CM/CA.

A second hurdle we see which is extremely relevant to CM/CA, is that it is seen as a challenge to make the strategy concrete in the ruleset. As the paradigm is still considered new and examples are limited, it is understandable that organizations struggle in deciding where CM/CA should be implemented. At the same time, organizations that did have examples named this as a driver in enabling them to change the business mindset.

5.3.5   Supporting persons

This supporting persons question is related to question B8. CM/CA-projects seem to start in different ways. Sometimes Internal Audit initiates, another time a controller, and sometimes a higher level board member. This explains a spread in answers given on which persons were key to the successes made. Also, the emphasis on gaining support from the "boss" can be understood, as this is an intrinsic part of hierarchical organizations. On whatever level the project is initiated, multiple participants agreed that enthusiasts/fuelers are crucial for success.

5.3.6   Stages of maturity

Most interviewed organizations were categorized as *Emerging*, although a few are aware of the necessity to move beyond *Traditional*, but aren't there yet. This mostly corresponds to the CARLAB study (Vasarhelyi et al., 2012) discussed in our Theoretical framework, where all participants were assessed as Emerging. The difference can be explained by the fact all participants in that study were large private sector organizations, where the below-Emerging assessed in our research were public sector organizations, suggesting public sector is lagging behind private sector in this respect.

5.4   Change in process

5.4.1   Purchase-to-Pay

We compare where CM was implemented according to the P2P processes drawn by our participants. Four out of five respondents mentioned CM was applicable to all three major P2P-process steps (Purchase order, Goods received and Invoice received). Only one participant only mentioned the last step. This implies that where the first process currently only uses CM in the steps before payment, most organizations use CM through the entire process. The third process drawn does not show CM as part of the process however, but as

the participant mentioned CM automates tasks throughout the process, although the process steps are unchanged, we interpret this as CM in every step.

We ask ourselves whether the process in place checks whether they are doing things correctly (*verification*), or checks whether they are doing the correct things (*validation*). This is an automation question that moves toward the question whether CM/CA is used to help the organization move forward in a strategic sense, which should be part of CM/CA.

A recent study (Borthick, 2012) illustrates how CA can be implemented in a Procure-to-Pay process, based on the Audit Maturity Model (table 2.4). The steps suggested correspond to the factors our participants named.

5.4.2 Payroll

This second-most explained process was the payroll process. Participants with actual results, more often than others, chose a *proof of concept* approach. This process was then chosen as one of the easiest processes to implement CM on. Each organization chose a different approach in implementing automated controls in this process though, which show a value for best-practices to structure CM processes.

Chapter 6

Conclusions

The goal of thesis was to evaluate the state of CM/CA, and assess the usefulness of lessons learnt to be used in the public sector. We have performed a literature review and conducted eighteen interviews in a multiple case study. After having gathered and analyzed conceptual and empirical research in chapter 2, we continued with our own empirical research. Our findings contribute knowledge based on literature and experiences in moving towards CM/CA.

6.1   Findings

Supporting question 1: *What is the current state of the auditing process in the public sector?*

We have found that the current state of auditing in the public sector can be considered emerging in most cases. However, as several projects in the public sector we found are considered traditional, public sector does seem to be lagging. This corresponds to the expected situation as laid out in the problem outline (see chapter 2.2).

Supporting question 2: *What are examples in private sector organizations to measure the impact of CM/CA?*

The general state of auditing in the private sector is further than in the public sector, all examples researched by us are considered emerging. All projects we observed were all of limited scope, and only visible in the financial domain of the organization. An increase in quality and process efficiency is visible in most cases. The realized impact of CM/CA corresponds to the impact that was expected by the participants.

We found several factors that enable and hurdle impact in these change projects. Reluctancy of employees to change was the largest hurdle slowing change. Named factors enabling

change cover several components, across the categories people, process, technology and urgency. We found all had an impact on change, where the effect of urgency was so apparent we showed it separately. The realized benefits, mainly an increase in quality and process efficiency, corresponded to the expected benefits.

Supporting question 3: *What could a more efficient auditing process in the public sector look like and how could it be implemented?*

As the *Purchase-to-Pay* process has been researched most by us, the results in appendix D show how our participants have implemented changes to this process to become more continuous. These examples indicate what a more continuous CM/CA process may look like. In particular in organizations where processes are inefficient, revising the entire process is needed to move towards CM/CA. The effect on the processes is usually an addition of automated checks, across all process steps, but each example uses different checks.

Although the collection of our findings is useful for any organization moving towards CM/CA, we argue there is still no situation available that we consider a proven *best practice*.

Research question: *What are the lessons learned in implementing Continuous Auditing in the private sector, that are applicable to the public sector?*

We conclude the public sector is equally suitable to implement CM/CA as the private sector. Most factors impacting change in private sector are applicable to public sector as well. Although implementation is still limited, public sector is making steps towards the emerging stage of the private sector. The most important factors impacting change can be seen already.

6.2   Limitations of the study

This research includes several limitations.

As we did not perform interviews before changes were made, comparing impact before and after relied on how participants explained the situation was. We believe the results of for example *expected benefits* may have been different if not named retrospectively.

Also, participants were gathered by looking for people familiar with the terms Continuous Monitoring or Continuous Auditing. Possibly, participants executing comparable projects unfamiliar with the terminology we used were not reached.

At one of the interviews with a participant from an advisory firm, a client was present. This may have colored the information, underexposing hurdles experienced at that particular client can be assumed.

Where in advance we expected first-hand experience with moving towards CM/CA, in three cases (participants 5, 11, 14) the participant was still in the planning phase, generating limited results on changes made (section D of the interview guide). In hindsight, we may conclude the role and experience of a number of participants could have been selected more strictly.

6.2.1 Research challenges

Although not necessarily limiting the value of this research, we would like to share factors impacting the gathering and processing of our results.

Most interviews were held in Dutch, and were translated to English in our transcription phase. We started our interviews in English, to ensure proper English terminology would be used, but we found we could gather higher quality results as participants were able to go into more detail in their mother tongue.

Dependency on room availability was a challenge one time, as we interviewed all participants at their respective office. The interview at organization D could not be performed in a closed environment, causing noise thereby limiting the quality of results.

In cases when a participant was late or had less time available than expected, time management was essential in making sure the most important information was gathered.

A major difficulty in the transcribing phase, was the fact that not all participants answered questions in the way we expected, generating interesting information, but insufficiently related to our research questions.

And we learnt by comparing the definitions given my participants describing CM and CA, there are large differences in interpretations. Making sure what a participant means when using a term has proven to be an important preliminary step in my research, and should be followed by others when discussing this subject.

6.3 Future research

More research in defining which method is most successful for implementation would be useful. As several participants mentioned they felt they were spending a lot of time defining how to implement CM, it could be useful to test which implementation model is most successful. Also, as touched upon as a limitation of our research, performing interviews before implementation has started would enable better comparison between before and after situations, improving assessment on which circumstances cause the largest effect.

A future research could have a more narrow scope, to generate more in-depth results. This can be structured by focusing on a specific aspect of CM/CA. For instance, an extensive maturity assessment would provide a deeper picture of the situation in the field. Also, considering this research mentioned how often specific challenges were mentioned by participants, a deep-dive research could be able to quantify how large the effect of a certain challenge is. For example, a subject could be geared towards measuring change in culture, evaluating which roles are most essential, or towards the effect of the organization structure on implementation success.

Another way of a more narrow scope, would be by looking at one specific type of organization. For example, an in-depth research on defining how other processes are impacted by implementation may be useful, as we only generated results on the Purchase-to-Pay and Payroll process. Literature could benefit from researching more organizations in the same sector, as more processes would overlap.

Several techniques currently researched in computer science as *predictive analytics* using *artificial intelligence*, were not in the scope of the organizations we spoke to in this context. The usefulness of predicting financial data could be of large use to decision makers, and improve assurance. We imagine research in how this could be implemented would be interesting.

Appendix A

Interview Guide

The usefulness of CM/CA, 'expected benefits' are widely discussed. However, publicly available information on real-world implementation lessons is limited. We are looking for best-practice examples, or proof-of-concepts that can be used to advise other organizations going forward. It's interesting to look at the public sector, where internal and external relationships and responsibilities are quite different compared to private companies. So, considering there have been more CM/CA trials in the private sector, we are looking at private sector companies, to learn from their lessons in CM/CA. Considering their learned lessons, and considering how the processes have changed, I will attempt to get a better view how the public sector can move forward too.

Disclosure:
-There are no right or wrong answers, we just want to learn from your experience.
-The interview is fully voluntary. You are not obliged to answering. As emailed earlier, we have planned the interview for one hour. However, you can leave at any time.
-For ease of processing, we'd like to record to transcribe later.
-Report will not be traceable to actual statements. We will process it confidentially, the supervisors will see to that.
-If you're interested, we'll be happy to share my findings with you afterwards.

-Is everything clear, and does it sound OK?
-Can we start recording?

A: Organization and Interviewee 05

1. What is your position title, and what are your responsibilities?

2. Since when have you worked in your organization, and how long have you had your current position and responsibilities?

3. How would you explain what Continuous Monitoring is?

4. How would you explain what Continuous Auditing is?

5. What is your experience with CM and CA?

B: Decision 10

1. Is there a project for moving to CM/CA, and how are you involved?

2. How were you introduced to CM/CA?

3. What were the reasons to start with the transition towards CM/CA?

4. Which examples do you look at?

5. What was the final goal of this project, and would you consider the scope CM or CA?

6. Who is or are ultimately responsible for the audit?

7. What were the most important expected benefits of the CM/CA-transition project?

8. Which measures were taken to gain support for the transition within the organization?

C: Old Process 20

1. Could you describe what the process looked like, step by step, before the transition towards CM/CA?

2. What were the key disadvantages or limiting factors of the old process?

D: The Goal 30

1. Which domains of the organization are subject to the change towards CM/CA?

2. Which aspects or components of CM/CA have been implemented, which changes have been made?

3. Could you describe what the process looks like now, step by step?

4. Which realized benefits do you see now?

5. What were the enablers of moving towards CM/CA?

6. What were the hurdles of moving towards CM/CA?

7. Which persons involved in this transition, were key to the successes made?

8. How mature would you consider the status of CM/CA in the organization?

9. *(question added later)* What were the key moments, impacting the plans and risk management of the organization and the project?

E: Future 45

1. Which challenges remain?

2. What are your next steps?

3. Which results do you expect to reach?

4. What is your vision of the future of audit?

5. *(if relevant)* What are the key differences to take into account, when applying CM/CA in public, compared to private sector, financial departments?

6. *(if not touched upon yet)* Would you say that the transition towards CM/CA introduced a change in culture in the organization?

F: Closing 55

1. Are there any relevant subjects we haven't touched upon yet?

2. Do you have any feedback or commentary on the interview we had today?

3. Would I be allowed to contact you in the future, concerning any follow-up questions I may have about this interview?

Appendix B

Results: CM definitions

P	Answer	Emphasis
1	Instrument for management to monitor process control.	controls, processes
2	Continuous checking data, with finding exceptions as the goal. With a first goal recovering the exceptions, and as second goal being analyzed to see how processes can be improved and decrease the number of exceptions. Improving processes and data quality.	data analysis, processes, exceptions
3	Continuously going along your processes, signaling imperfections and making visible. Part of continuous improvement: continuous quality improvement on all key processes in the organization.	processes, exceptions
4	Continuously monitoring processes, to remove errors and make the process more efficient. Embedding and executing controls in the process design, so it's visible where the errors are made, and can be prevented.	processes, exceptions, efficiency
5	Periodically determining the status of being in control, using data analysis.	being in control, data-analysis
6	The business taking measures, in the IT-environment, that if exceptions are found they have them checked, and exception lists are generated. And that they have a follow-up process, that if somebody sees it, somebody addresses it.	exceptions, follow-up
7		
8	Implementing and running analysis tools in the business, possible after CA.	data analysis
9	Firstly to ensure transactional data integrity, and secondly from data management: are my processes effective and efficient?	integrity, transactions, efficiency, effectivity
10	Continuously monitoring certain transactions, making sure no exceptions are to be seen. Alerts for exceptions, advanced and automated.	transactions, exceptions
11	Using a data analytics system, to monitor periodically or continuously, with automatic controls.	data analysis, system, controls
12	Organizing controls to secure risks, on an automated process.	controls, risk, processes
13	Identifying anomalies in the business, based on continuous data analytics. Plausibility checks, based on analytics, generating exception reports. Then follow-up, process the exception reports whether they need to be corrected.	data analysis, exceptions, follow-up
14	Monitoring by client, whether processes and controls are working.	controls, processes, effectivity
15	A process enabling an organization to have a grip on certain strategic activities. Continuously trusting certain processes are running, and no large mistakes are occurring. Can also be operational, besides financial.	process, being in control, exceptions
16	Implementation of data-analysis, similar to GRC tooling. Executing data analysis periodically. CM is the checking of controls + mapping the processes and putting control measures into practice well + process improvement (identifying bottlenecks). Goal: improving processes.	data analysis, processes, controls
17	Monitoring: customer is able to monitor by himself, and prove they are in control (instead of the accountant). Continuous: periodically (real-time to quarterly, as often conclusions can be drawn.	being in control, periodically
18	Provides management direct insight in implemented controls. Gives alerts when a value exceeds certain tolerated parameters, making it possible to act and prevent errors.	controls, exceptions, follow-up

TABLE B.1: Results Question A3: Definition of Continuous Monitoring

Appendix C

Results: CA definitions

P	Answer	Emphasis
1	Instrument for the internal auditor, to see whether management monitors the internal controls well.	controls, assurance
2	Not relevant for us yet, first focusing on CM.	CM-dependent
3	Assurance upon CM, checking whether the follow-up was correct.	assurance, CM-dependent, follow-up
4	Higher level than CM, no lists but a process monitoring dashboard.	processes, monitoring
5	Checking whether CM is sufficient.	assurance, CM-dependent
6	Auditing whole masses, instead of sample sets.	large-scale
8	Periodic data analysis checks providing insight to the auditor, about the performance of controls in the business.	controls, data analysis, periodically
9	By using automated controls, being able to provide assurance as an auditing firm. Can only be after CM. Providing assurance on numbers the business reports.	controls, assurance, CM-dependent
10	Besides data analysis, also sources like having conversations.	data-analysis
11	Looking at what the external auditor needs to give a signature.	approval
12	Leaning on existing CM system to perform risk analysis and see which processes are not running well.	risk, processes, CM-dependent
13	Making the audit process more dynamic, partly based on the capabilities of CM. If you have data analyses and exception reports in CM, continuously supervising for exception in the business, and following up. Then the audit process can be more continuous, instead of just at moments, looking at the internal controls.	supervision, controls, processes, CM-dependent
14	Validating whether the system works, continuously instead of twice a year. Check the exceptions as a result of daily connection with the client.	assurance, exceptions, system
15	Process providing an internal or external auditor assurance, on a certain process or other object of research, targeted at an audit finding.	processes, assurance, audit finding
16	CM plus the audit trail bringing more grip and compliance. Goal: numbers assurance.	grip, compliance, assurance, CM-dependent
17	Assurance. On the one side: (the future) leaning on CM at the customer, rule-set/flagging and checking follow-up. On the other side: if customer doesn't have CM, accountant themselves monitoring with data analysis, multiple times per year.	assurance, follow-up, data-analysis
18	Continuously collecting evidence, instead of after a period, to perform the audit as efficiently as possible.	continuous data collection, efficiency

TABLE C.1: Results Question A4: Definition of Continuous Auditing

Appendix D

Results: Processes

Digitized versions of the processes subject to CM/CA, as sketched by the participants. Changes since the CM/CA-transition are marked in red.

D.1 Purchase-to-Pay

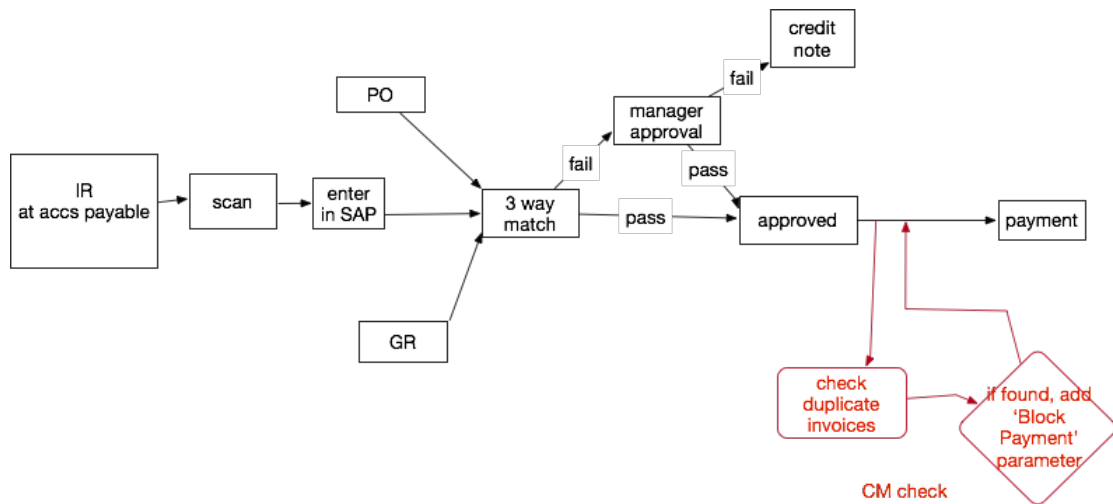Five participants sketched a Purchase-to-Pay process.
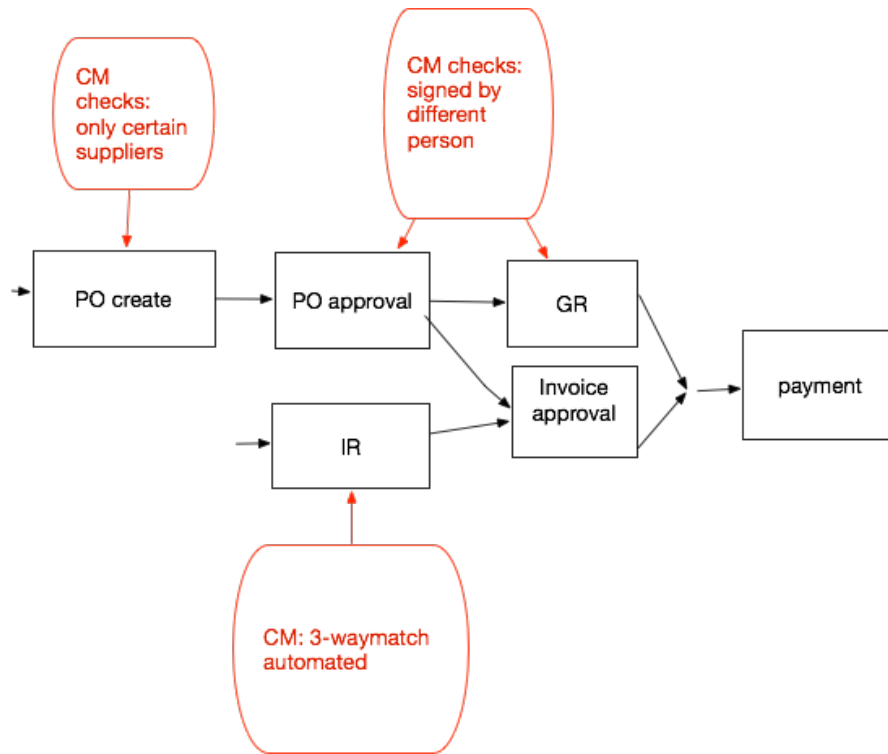

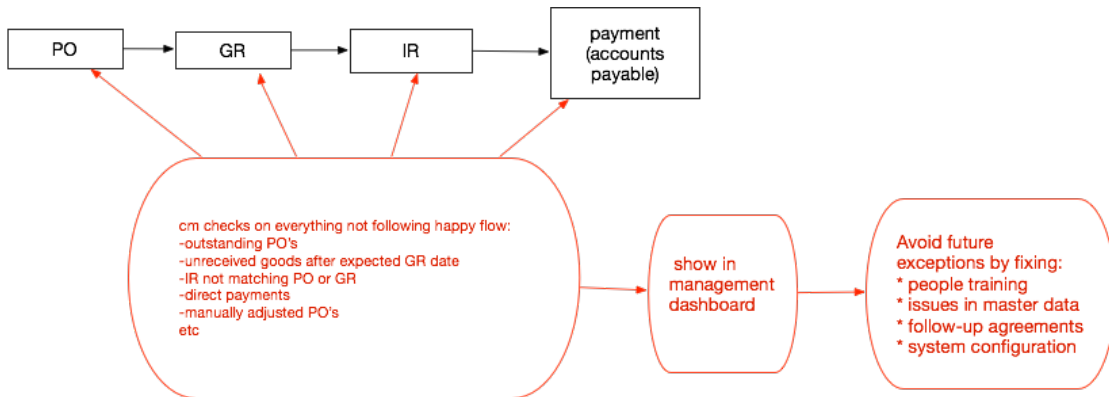FIGURE D.1: First P2P Process

FIGURE D.2: Second P2P Process

FIGURE D.3: Third P2P Process

.

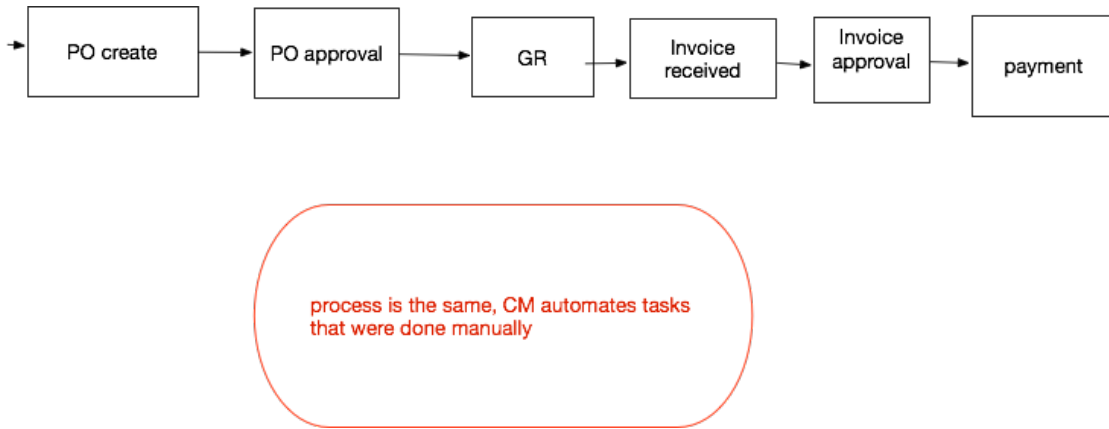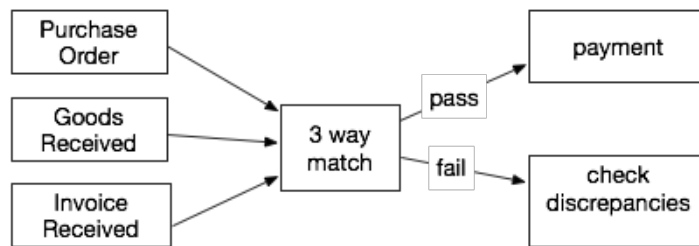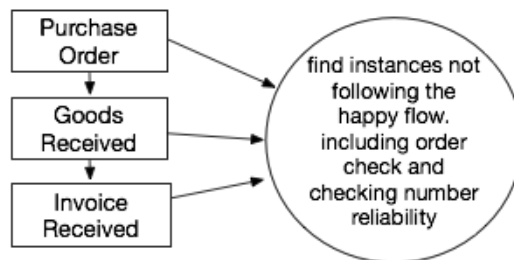process is the same, CM automates tasks that were done manually

FIGURE D.4: Fourth P2P Process

old

note: (26.30) not used by public sector, they don't have 3 way match as they don't monitor the Goods Delivered, they only rely on whether budget holder approved

cm

uses the outcome of the normal system, but checks the reliability

FIGURE D.5: Fifth P2P Process

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D.2 Payroll
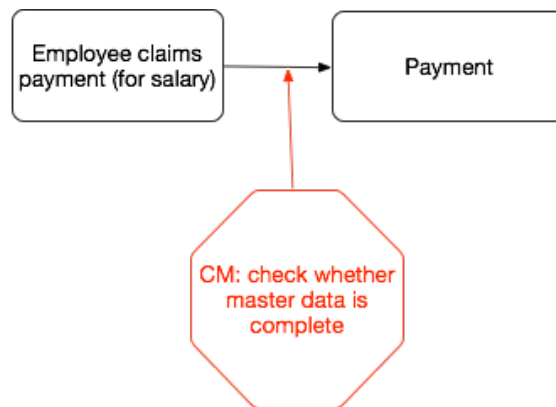
Three participants sketched a Payroll process.

FIGURE D.6: First Payroll process

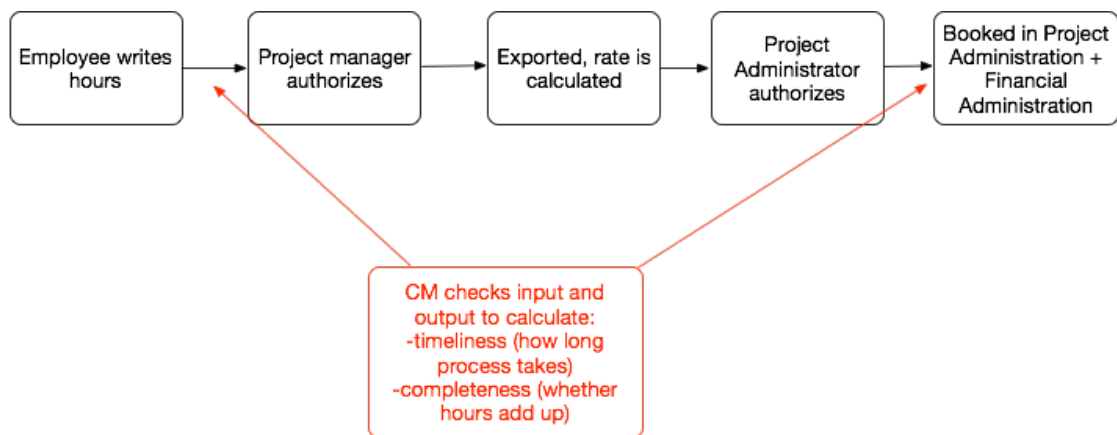FIGURE D.7: Second Payroll process

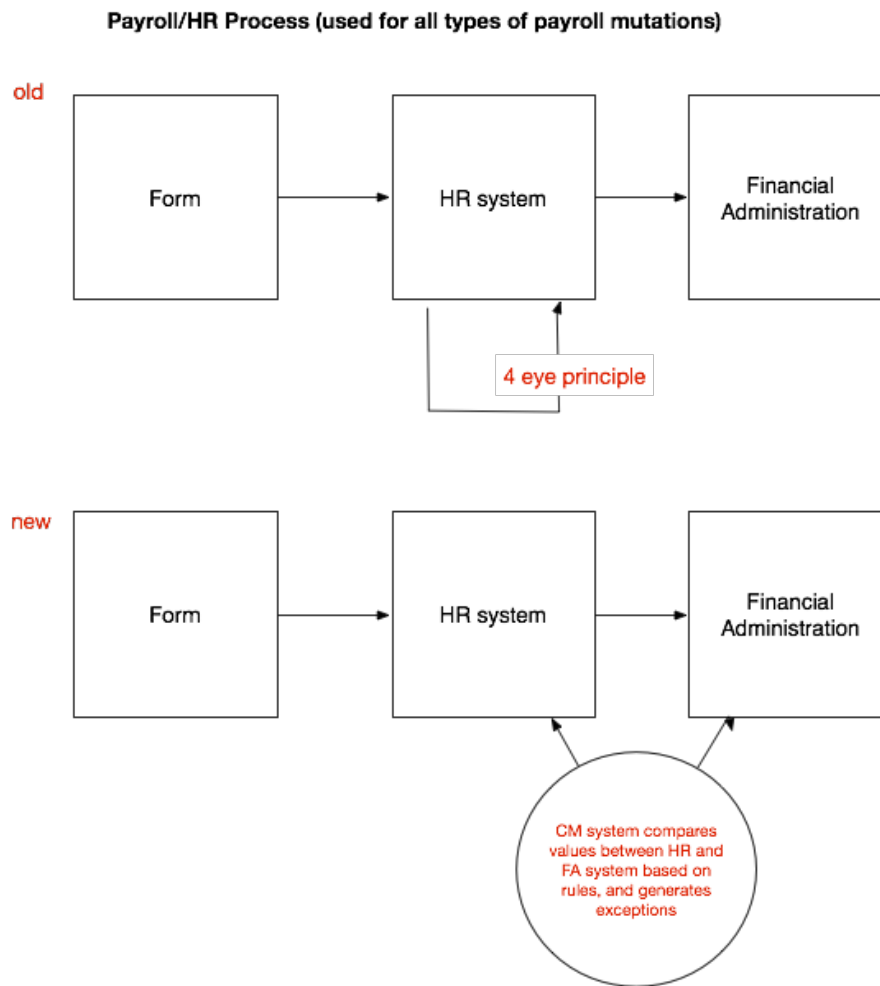**Payroll/HR Process (used for all types of payroll mutations)**

FIGURE D.8: Third Payroll process

D.3   Residual

Other processes drawn were only drawn once. As they can't be used for comparison, usefulness outside the specific environment can't be assessed.

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