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An IRF Grant Research Summary

Continuous Auditing and Continuous Monitoring Technology Implementation: A Worldwide Survey

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Background

The concept of continuous auditing was first developed about two decades ago, yet the actual adoption of continuous auditing technology by organizations has developed at a slow pace. Past surveys by international accounting firms such as PwC (2006), KPMG (2010), and Grant Thornton (2011) indicate that among their clients between 5% and 15% have a fully operational continuous auditing system, and 15% to 35% have a partial system in place that is not yet fully developed.[1]

A common result of past surveys on continuous auditing is that, regardless of the respondent organizations' current state of adoption, survey respondents were optimistic: They believed that in two years' time they would have a considerably higher implementation level. Yet the evidence to date is that the adoption of continuous auditing has continued to advance slowly. It raises the question, why is there a persistent lag in the adoption of continuous auditing?

The aim of our study is to gain insight into the current state of affairs. Toward this end we conducted two similar but slightly different online surveys of IMA members worldwide, one on continuous auditing and the other on continuous monitoring.[2] Based on our findings, we characterize the current state of adoption of continuous auditing and continuous monitoring as more experimentation and pilot testing than full adoption.

A brief description of our survey in the next section is followed by a two-part executive report. Part I describes our findings on the practice of continuous auditing technology, while Part II describes our findings on the implementation of continuous auditing and continuous monitoring as analyzed through the technology adoption model that we selected.[3]

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Brief Description of Surveys

Our online surveys were e-mailed on our behalf by the IMA to worldwide members. The continuous auditing survey was e-mailed to members whose membership profile listed one of the following responsibilities: internal auditing, risk management, information systems, or general accounting. The continuous monitoring survey was e-mailed to members whose job title was one of the following: chief financial officer, controller, director/manager. The e-mails, sent in May 2011, asked respondents to complete the survey provided they were knowledgeable about their company's actual or planned adoption of continuous auditing/monitoring technology and, if not, to forward the e-mail to the appropriate person within their organization. We e-mailed 9,013 continuous auditing surveys and received in return 210 usable responses (2.33% response rate), and 17,255 continuous monitoring surveys and received in return 405 usable responses (2.35% response rate). The percentage breakdown of returned responses by geographic region of company operations was: North America, 61%; Middle East, 27%; Asia, 6%; Europe, 4%; others, 2%. These percentages are comparable to IMA's worldwide membership breakdown.

All participants were asked various descriptive questions about the state of their company's adoption of continuous auditing/continuous monitoring technology, followed by a series of questions as prescribed by the UTAUT model.[4] One of the initial survey questions categorized the respondent's full set of responses as falling under one of four categories:

- CA/CM technology fully in place
- CA/CM technology partially in place
- CA/CM technology not yet implemented, but plans in place to do so
- CA/CM technology not yet implemented, and no plans in place to do so

A tabular description of the data that we collected can be depicted as having 10 cells (see below).

Due to the fact that we gathered so many "cells" of information, there are numerous possibilities for analysis based on grouping in comparing cells. The analyses that we have performed, the results of which are described in this report, are:

1. Descriptive information, continuous auditing (cell 1)
2. PLS[5] analysis of UTAUT responses across all continuous auditing cells (cells 2 through 5)
3. PLS analysis of UTAUT responses comparing cells 4 and 5 to cells 9 and 10
4. PLS analysis of UTAUT responses comparing cells 4 and 9 to cells 5 and 10

In Part I we discuss the results of our analysis related to item 1, and in Part II we discuss the results of our analyses related to items 2 through 4.

Tabular Description of Collected Data

	CONTINUOUS AUDITING (CA)	CONTINUOUS MONITORING (CM)
Descriptive information	cell 1	cell 6
UTAUT questions – fully in place	cell 2	cell 7
UTAUT questions – partially in place	cell 3	cell 8
UTAUT questions – plans in place	cell 4	cell 9
UTAUT questions – no plans in place	cell 5	cell 10

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PART I: DESCRIPTIVE INFORMATION ON CONTINUOUS AUDITING TECHNOLOGY

Key Findings – Continuous Auditing Practice

• Respondents' perceptions of the key benefits of a continuous auditing system are its ability to provide 100% audit coverage of transactions, increase the accuracy of accounting information, and reduce fraud risk.

• Numerous factors determine how a particular company approaches its acquisition of continuous auditing technology; there is no "one-size-fits-all" approach. A slim majority of companies choose in-house development of their continuous auditing systems, but significant proportions of companies outsource the continuous auditing function, while others purchase their continuous auditing technology from an outside vendor.

• Continuous auditing technology is sufficiently sophisticated and complex that some companies assign the responsibility for performing continuous auditing to their information technology (IT) group, while other companies view continuous auditing as a vital risk management tool and, accordingly, assign the responsibility for performing continuous auditing to their risk management group.

• In the early implementation stages, some organizations appear to give initial responsibility for the continuous auditing system to their IT group. Once the system is fully implemented, responsibility is transferred to the internal auditing function.

Survey Results

Current state of continuous auditing in survey respondents' companies
- Fully operational in one or more of our company's systems – 21%
- In place but not yet fully developed – 22%
- Not implemented yet but scheduled to be implemented in the future – 16%

- Not implemented and no plans for future implementation – 40%

Comparing these responses to the three international accounting firm surveys shown in Table 1 reveals that the percentage of companies that have either fully operational continuous auditing systems or systems in place but not yet fully developed has not increased much, if at all.

Perceived benefits of continuous auditing
Overall, respondents view accuracy as the most important benefit of a continuous auditing system, followed in order of importance by timely communication, audit efficiency, timely analysis, and cost savings (Table 2).

Focus of continuous auditing
Survey respondents rated the monitoring of fraudulent activities as the most important focus, followed by risk monitoring, testing of controls, detail testing of transactions, and performance evaluation (Table 3).

Ownership of continuous auditing
Internal audit has responsibility for continuous auditing in about three-quarters of respondents' companies; other companies assign the responsibility to an IT group or an accounting/finance group. A comparison of companies with fully implemented continuous auditing systems to companies in which a continuous auditing system is in place but not yet fully implemented reveals that the IT group is primarily responsible a greater percentage of the time in the latter (8.2% vs. 13.2%). (Table 4)

Performance of continuous auditing
The *performance* of continuous auditing is not fully reflected by ownership. A majority of respondents (57.7%) indicated that internal auditing is assigned *performance* of continuous auditing, a percentage that is less than the three-quarters of internal auditing departments that are assigned the *responsibility* for continuous auditing as per the preceding paragraph. The overall percentages of companies in which IT management and risk management perform continuous auditing are 18.9% and 16.3%,

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respectively. IT is assigned the responsibility of performance of continuous auditing in a higher percentage of companies in which the system is in place but not yet fully implemented (25.5%) than in companies in which the continuous auditing system is fully operational (16.3%). (Table 5)

Continuous auditing frequency
The majority of respondents' companies perform continuous auditing on a monthly or quarterly basis. 13.2% of respondents' companies perform continuous auditing on a real-time basis. (Table 6)

Source of development of continuous auditing system
Among companies with fully developed and in-place continuous auditing systems, the source of the development of their continuous auditing system breaks down like this:
- developed their technology within their own company or insourced – 69.8%
- outsourced the development of their technology – 19.0%
- purchased their technology from an outside vendor – 11.2%

The comparable percentages for companies with partially developed but not fully in place systems are:
- developed their technology within their own company or insourced – 52.4%
- outsourced the development of their technology – 27.0%
- purchased their technology from an outside vendor – 20.6%

Hence, most companies choose in-house development of their continuous auditing systems, but significant proportions of companies outsource or purchase from an outside vendor. (Table 7)

Plans for future implementation of continuous auditing technology
For those respondents with no currently implemented system, we asked about their plans for the future. Sixty-four percent indicated plans to implement the technology within the next 12 to 24

months. The remainder were evenly split between the categories "the next 6 months" and "after 24 months." (Table 8)

Effect of economic events on plans for continuous auditing
We asked those respondents whose companies had not yet adopted continuous auditing technology whether the economic climate had had an effect on their implementation plans. Eighty-seven percent replied "not at all" while only 9% answered "yes" and 4% answered "somewhat." (Table 9)

Reasons for not yet implementing continuous auditing
We asked those respondents whose companies had not yet adopted continuous auditing technology the reasons why they had not done so. By far the most popular answer was "we have not looked into continuous auditing yet" (76%). (Table 10)

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PART II: PLS ANALYSES OF UTAUT RESPONSES

The UTAUT model is based on four key constructs:

- **Effort expectancy –** the extent to which the technology is expected to reduce work effort by users of the technology, i.e., make the job easier
- **Performance expectancy –** the extent to which the technology is expected to increase performance, i.e., more effective audits, increased efficiency, etc.
- **Facilitating conditions –** the extent to which resources, infrastructure, and other organizational resources are in place to support the technology
- **Social influence –** the extent to which internal and/or external parties influence the decision to adopt the technology

The key findings that follow are summarized in reference to these four key constructs.

Key Findings – UTAUT Model Analysis of Continuous Auditing/Continuous Monitoring

- Among all continuous auditing technology respondents across the four states of adoption, from fully implemented technology to those with no current adoption or plans to do so, perceptions of *effort expectancy* and *social influence* are significant predictors of users' intentions to adopt continuous auditing.
- Among organizations with plans to implement continuous monitoring technology, the key motivation for doing so is *performance expectancy*, i.e., those organizations are convinced that the technology will make a significant contribution toward organizational goals. We found this not to be the case, however, for continuous auditing technology.
- Those organizations without any plans to implement continuous auditing or continuous monitoring technology do not give a high rating to the *performance expectancy* of potential technology implementation.

- There is no significant high rating for *effort expectancy* – i.e., the extent to which the technology is expected to ease work effort – among organizations with plans to implement or organizations with no such plans.
- Both *facilitating conditions* and *social influence* are significant factors that influence the implementation of continuous auditing or continuous monitoring technology. *Facilitating conditions* represent the extent to which the organization has the infrastructure and resources in place to support technology implementation, and *social influence* represents internal and external forces that push toward technology adoption.

Conclusion

In spite of the fact that the concept of continuous auditing was first introduced over two decades ago, and that the concept has garnered a considerable amount of attention in both the academic and professional literature, continuous auditing has been adopted to a limited extent to date, and almost exclusively in the internal audit domain. While past surveys of CAEs and other internal audit executives have indicated that plans for the implementation of continuous auditing were robust (Grant Thornton, 2011; KPMG, 2010; PwC, 2006), the results of this study's survey indicate that progress has been made, but there is still continued lag in the implementation of continuous auditing systems.

This study explores this lag in the adoption of continuous auditing, and seeks answers to why this is the case. We surveyed IMA members worldwide about the current state of adoption of continuous auditing and continuous monitoring technology in their companies. The key findings presented above indicate that continuous auditing and continuous monitoring technology is viewed with positive potential by many organizations, but at this point a minority of organizations have implemented the technology to any significant extent. On a worldwide basis, continuous auditing and continuous monitoring are still in the initial experimentation phase.

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Table 1: Summary of Recent Surveys' Findings of Continuous Auditing Technology Adoption

	PWC 2006[1]	KPMG 2010	GT 2011[2]
Fully operational in one or more of our company's systems.	13%	7%	__[3]
In place but not yet fully developed.	37%	13%	33%[3]
Not implemented yet but scheduled to be implemented in future.	31%	3%	__[4]
Not implemented and no plans for future implementation.	19%	77%	67%[4]
Total	100%	100%	100%

[1] PwC 2006 = PricewaterhouseCoopers 2006

[2] GT 2011 = Grant Thornton 2011

[3] Published survey does not distinguish between "fully operational" and "not fully developed."

[4] Published survey does not distinguish between "no plans at all" and "plans but not yet implemented."

Table 2: Most Important Benefits of Continuous Auditing

	MEAN RATING*	
	CA FULLY IN PLACE	CA PARTIALLY IN PLACE
Accuracy	5.90	6.08
Timely communication	5.60	5.87
Audit efficiency	5.43	5.82
Timely analysis	5.45	5.79
Cost savings	5.44	5.53

*Rating scale: 1 = Not at all important; 7 = Extremely Important

Table 3: Focus of Company's Continuous Auditing

	MEAN RATING*	
	CURRENTLY IN PLACE	TO BE IMPLEMENTED IN FUTURE
Monitoring possible fraudulent activities	5.76	5.84
Risk monitoring	5.63	5.82
Testing of controls	5.64	5.74
Detail testing of transactions	5.52	5.45
Performance evaluation	4.93	4.92

*Rating scale: 1 = Not all important; 7 = Extremely Important

Table 4: Ownership of Continuous Auditing

	CA FULLY IN PLACE	CA PARTIALLY IN PLACE	OVERALL
Internal auditing	78.6%	73.7%	77.2%
IT group	8.2%	13.2%	9.6%
Accounting/ finance function	9.2%	7.9%	8.8%
Others	4.1%	5.3%	4.4%
Total	100.0%	100.0%	100.0%

Table 5: Responsibility for Performing Continuous Auditing

	CA BEING PERFORMED CURRENTLY	CA TO BE PERFORMED IN FUTURE	OVERALL
Internal auditing	60.3%	50.9%	57.7%
IT management	16.3%	25.5%	18.9%
Risk management	15.6%	18.2%	16.3%
Other	7.8%	5.5%	7.1%
Total	100.0%	100.0%	100.0%

Table 6: Continuous Auditing Frequency

	CA FULLY IN PLACE	CA PARTIALLY IN PLACE	OVERALL
Real time	11.2%	18.4%	13.2%
By the minute	1.0%	0.0%	0.7%
Hourly	1.0%	0.0%	0.7%
Daily	13.3%	7.9%	11.8%
Weekly	6.1%	15.8%	8.8%
Monthly	29.6%	26.3%	28.7%
Quarterly	34.7%	26.3%	32.4%
Other	3.1%	5.3%	3.7%
Total	100.0%	100.0%	100.0%

Table 7: Source of Development of Continuous System by Percentage

	CA FULLY IN PLACE	CA PARTIALLY IN PLACE
Developed within your company or insourced	69.8%	52.4%
Developed by an outsourcing partner	19.0%	27.0%
Purchased from an outside vendor	11.2%	20.6%
	100%	100%

Table 8: Plans for Future Implementation

In the next 6 months	16%
In the next 12 months	32%
In the next 24 months	32%
After 24 months	21%
Total	100%

Table 9: Have Recent Economic Events Affected Company's Plans to Implement Continuous Auditing?

Yes	9%
Somewhat	4%
Not at all	87%
Total	100%

Table 10: Reasons for Having No Plans for Implementation

We do not believe it would benefit us much	8%
We lack the expertise	20%
We lack the technology	15%
We do not have the necessary funds	17%
We have not looked into continuous auditing yet	76%
Other	11%

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Venkatesh, V.; Morris, M. G.; Davis, G. B.; and Davis, F. D. User acceptance of information technology: Toward a Unified View. MIS Quarterly 2003: 27 (3), 425-478.

[1] Table 1.

[2] The research literature commonly distinguishes between continuous auditing and continuous monitoring in the following way: the former is performed by an internal or external audit group that is independent of business operations, and the latter is performed by management that is part of business operations. We follow this distinction.

[3] Our study's theory is built on the technology adoption model referred to as the Unified Theory of Acceptance and Use of Technology (UTAUT). A portion of each our surveys contained questions as prescribed by UTAUT. We analyzed the responses to those questions using the partial least squares (PLS) method of analysis.

[4] Ibid.

[5] Ibid.