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## The Sarbanes-Oxley Act and the changing role of the CIO and IT function

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Steve G. Sutton\* and Vicky Arnold

University of Central Florida  
College of Business Administration  
Kenneth G. Dixon School of Accounting  
P.O. Box 161400, Orlando, Florida, USA  
Fax: (407) 823 3881  
E-mail: sgsutton@unimelb.edu.au  
E-mail: varnold@unimelb.edu.au  
\*Corresponding author

**Abstract:** The focus of this study is on the changing role of the Chief Information Officer (CIO). At a time when there is an increasing focus on corporate governance and enterprise risk management, the competencies required of CIOs are evolving causing a shift to a third era of the CIO. This shift is being accelerated and influenced by the passage of the Sarbanes-Oxley Act of 2002 in the USA. This Act mandates detailed reporting of internal controls over financial and related systems, and has consumed the energy and the budgets of the IT function in the past few years. In the coming years, the Act will likely impact the success of CIOs and the competencies desired by organisations hiring CIOs. These issues are explored in detail. The article concludes with an agenda for research on CIOs in this new era.

**Keywords:** Chief Information Officer (CIO); Sarbanes-Oxley Act; IT governance; internal control; IT security; corporate governance; enterprise risk management; interorganisational systems.

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**Biographical notes:** Steve G. Sutton is KMPG Professor of Accounting at the University of Central Florida and Professorial Fellow of Accounting and Business Information Systems at the University of Melbourne. He currently serves as Editor of the *International Journal of Accounting Information Systems* and formerly served as a departmental editor for *DataBase*. His research interests are in the areas of the impact of advanced information technologies on individuals, organisations, and society. His current focus is on the impact of intelligent decision aids on human judgement and decision making, and assurance models for electronic commerce in business-to-business relationships. Professor Sutton was the organising and founding president of the Association for Information Systems' Special Interest Group on Accounting Information Systems, and also previously served as a Chair of the American Accounting Association's Information Systems Section.

Vicky Arnold is Ernst and Young Professor of Accounting at the University of Central Florida and Principal Fellow in Accounting and Business Information Systems at the University of Melbourne. She is Editor of *Advances in Accounting Behavioral Research* and Associate Editor of the *International*

*Journal of Accounting Information Systems*. She recently co-edited a monograph for the Information Systems section of the American Accounting Association titled *Researching Accounting as an Information Systems Discipline*. She is currently Treasurer of the Association for Information Systems' Special Interest Group on Accounting Information Systems. Her research interests are in judgement and decision making, and the impact of information technology on decision making by individuals, organisations, and society. Her prior research has been published in an array of both accounting and information systems journals.

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## 1 Introduction

The emerging importance of the Chief Information Officer (CIO) within contemporary organisations has been well-documented over the past 20 years (Rockart *et al.*, 1982; Benjamin *et al.*, 1985; Applegate and Elam, 1992; Stephens *et al.*, 1992; Luftman and McLean, 2004). Over time the CIO has arisen in conjunction with the information systems function – moving from simply a data processing function supporting basic accounting applications to a broad-based strategic component of successful organisations.

The varied reports on the skills possessed by successful CIOs have also evolved over time. In the early days, the majority of senior Information Technology (IT) executives arose within the organisation as skilled IT technicians prepared to lead the development of hardware and software to support the information processing needs of organisations (Applegate and Elam, 1992). This focus on hard IT skills was eclipsed over time by the need for CIOs with management skills and experience in managing divisional units. The evolution of primary skills continued to be related to business acumen and the ability to bring business process knowledge together with IT knowledge in a strategic orientation (Enns *et al.*, 2003; Luftman and McLean, 2004).

The passage of the Sarbanes-Oxley Act of 2002 in the USA promises to once again radically alter the CIO's position and, accordingly, the necessary knowledge base. The Sarbanes-Oxley Act mandates three significant changes in reporting that impact the role of the CIO:

- 1 Section 404 requires mandatory reporting on the adequacy of the organisations' system of internal controls over financial and related systems that impact financial aspects of the organisation.
- 2 Section 404 requires that the Chief Executive Officer (CEO) and the Chief Financial Officer (CFO) both sign off on the adequacy of internal controls and reliability of financial reports.
- 3 Section 409 requires that incidents or events impacting the financial aspects of an organisation be reported in real-time to the US Securities and Exchange Commission (SEC).

All three of these requirements are dependent on the organisation's information systems to efficiently and effectively support compliance with the mandates.

While the Sarbanes-Oxley Act of 2002 sets requirements for all public companies registered on US stock exchanges, the net effect is to impact the compliance requirements of most major public companies globally. Any company based within the USA or outside

of the USA must comply with the Sarbanes-Oxley Act if they wish to be registered with a US stock exchange and have their stock shares traded on the exchanges. There are an estimated 469 non-US companies listed on the New York Stock Exchange, and 451 listed on the Nasdaq exchange. In the European Union alone, there are 185 and 149 registered companies respectively on the two exchanges. Many more companies also file with the SEC and would accordingly fall under the Sarbanes-Oxley Act's requirements. In contrast to the normal accommodations provided by the SEC to foreign registrants, there are no exceptions to the Sarbanes-Oxley provisions provided to foreign public companies registering in the USA (Mayer *et al.*, 2002). The net effect is that the mandates under the Sarbanes-Oxley Act are having a significant impact on the role and future of the CIO position across the globe.

The purpose of this paper is to highlight the impact of the Sarbanes-Oxley Act on the role of the CIO and the corresponding impact on the skill set required of CIOs in the future. The Sarbanes-Oxley Act places the CIO right in the midst of a new focus on regulatory reporting and internal control documentation. This fundamental shift in responsibilities raises a multitude of questions as to the applicability of prior findings on the role and importance of CIOs in the emerging corporate environment. As a result, much of the extant research on CIOs should be revisited to reconsider how the findings of these studies evolve in a new era impacted by Sarbanes-Oxley reporting requirements.

This study contributes in three important ways. First, the implications of the Sarbanes-Oxley Act and its impact on the CIO role are introduced to the information systems literature. Second, a focused examination of the primary findings in studies related to the role of the CIO is conducted to identify specific areas that are likely to change in this new era. Third, a general framework to guide future research on the evolving role of the CIO is provided.

The remainder of this paper is divided into four sections. The first section overviews the key requirements of interest in the Sarbanes-Oxley Act of 2002 as it impacts the role of the CIO and the IT function. The following section overviews the extant research examining the role, skill-set, and knowledge-base of successful CIOs. The third section integrates the impact of the Sarbanes-Oxley Act with the role of the CIO and identifies areas of disconnect and/or change in an era altered by the Act. The fourth and final section overviews the key research issues unveiled in the study, and provides some concluding thoughts.

## **2 The Sarbanes-Oxley Act of 2002**

The two crucial components of the Sarbanes-Oxley Act in terms of CIO concerns are Sections 404 and 409. Section 404 requires management to report on the effectiveness of its internal controls over financial reporting. Management must report that it is responsible for assuring an effective ongoing system of internal controls over financial reporting and must assert in the report whether an effective system of internal controls exist along with clear articulation of how management designed and tested the system of internal controls for effectiveness. Any changes to the system of internal controls must be reported by management, and the auditor must report on the reasonableness of that report. Section 409 requires real-time disclosure of certain material events impacting the financial aspects of the organisation. The SEC requires Form 8-K disclosures to be filed within a matter of days upon the occurrence of such a material event (Birnbach, 2004).

While management was previously shouldered with the responsibility of maintaining an effective system of internal controls under the US Foreign Corrupt Practices Act of 1976, the Sarbanes-Oxley Act raises the reporting and, attestation requirements by an independent auditor, and imposes far more severe penalties for failure to live up to the requirements. Both the CEO and the CFO are responsible for understanding the system of internal controls and for reporting on those controls. Failure to maintain effective internal controls can subject both the company and the company's executives to civil and criminal liability. Criminal penalties arise if the CEO or CFO knowingly or wilfully issues inaccurate financial statements. Knowingly issuing such statements carries a penalty of \$US1 million in fines and ten years in jail, while wilfully issuing such statements carries a penalty of \$US5 million in fines and 20 years in jail (Birnbach, 2004).

While the CEO and the CFO are unquestionably held responsible for failures, the burden is often extended to other executives as well. Given the critical role of IT in meeting the requirements of both Sections 404 and 409, CIOs are frequently being required to certify the accuracy of data in the financial IT systems. The CFO and CEO are still ultimately liable under the Sarbanes-Oxley Act, but the additional certification by the CIO also makes the CIO (who generally serves under the CEO) both internally susceptible and externally open to civil litigation. Certification by the CIO is expected to become common very quickly with Gartner predicting that in 2005, 70% of publicly traded companies will mandate that their CIOs sign-off on the adequacy of controls and accuracy of data in financial IT systems (Koch, 2004). This percentage is likely to increase quickly as the scope of Sarbanes-Oxley evolves over time. For instance, while the Sarbanes-Oxley Act does not specifically cover the reliability of information systems, the SEC encouraged independent financial auditors to closely examine the information security controls of their audit clients and to consider systems reliability (Myers, 2005). Additionally, it is unclear where the reach of internal controls over systems impacting financial reporting ends under Sarbanes-Oxley. Most observers believe that ultimately the internal control coverage will need to extend to sales, marketing, operations, regulatory compliance, and other organisational activities that directly or indirectly impact the financial aspects of an organisation (Katz, 2003).

The reporting requirements place a substantial burden on the organisation. Any changes to controls or systems that affect financial data and reporting must be reported. If an organisation decides to implement a new system that directly or indirectly impacts the financial data, internal control documentation will be required over both the existing system and the system to be implemented, thus adding substantially to the extensive internal control documentation that management must maintain (Koch, 2004). The scope of the systems change can exponentially expand the level of documentation.

Consider in the extreme case of a conversion from one Enterprise Resource Planning (ERP) software system to another ERP software system. Sarbanes-Oxley Act requirements would mandate full documentation of the internal controls in the first system, followed by complete documentation of the then new ERP system at the point of conversion (Katz, 2003). This is further compounded by the flexibility of controls in ERP systems that include both inherent controls and configurable controls. Configurable controls offer a massive number of options, and there could easily be a million control options within a critical business process (Goff, 2004). In most cases, existing systems were not been documented during implementation and determining the control options that were selected during configuration is a monumental task to complete ex post.

The problem grows even more complex with organisations that have multiple ERP implementations. By one estimate, the average \$US1 billion company maintains 48 financial programmes along with three ERP systems (Goff, 2004).

By all accounts, the rush to meet reporting timelines in 2005 has led to most organisations using labour intensive and costly processes to document controls. In 2003, roughly \$US3 billion was spent on Sarbanes-Oxley compliance efforts with 90% of the funds being spent on internal staff and consultants (Koch, 2004). In 2004, the cost of Sarbanes-Oxley compliance efforts increased to an estimated total of \$US5 billion with 80% going to staff and consultants (Goff, 2004). Long-term cost control and efficiency mandates that automated solutions be pursued in the future to automatically document internal control changes and to facilitate the real-time reporting requirements under Section 409.

Software solutions have flooded the market, but most have failed to achieve sales targets. There are over 50 software packages available to support Section 404 documentation of internal controls. However, as most organisations have pursued labour intensive solutions to meet the first year reporting requirements under Sarbanes-Oxley reporting, the investment has not been made in the automation of processes and the software that will enable such automation. Sales of such software packages are expected to fare much better in year two, after organisations will have been through the documentation process once with their independent financial auditors and will be in a better position to select a package that will meet the documentation needs as determined by the auditor's assurance process in year one of reporting under the Sarbanes-Oxley Act.

On an overall basis, the Sarbanes-Oxley Act has added a tremendous burden of documentation in the area of internal controls. To date, most organisations have heavily relied on external consultants and internal auditors to manually fulfil internal control documentation needs. In the future, the CIO and the IT function as a whole will be expected to take a more critical role in facilitating the automation of such documentation and in establishing design and change management procedures that assure integration of adequate internal controls within information systems processes.

### **3 The traditional role of the CIO**

Extensive literature has evolved over time, documenting the prototype of a CIO and predicting what the future CIO would need to be. The bulk of this work arose in the late 1980s and the early 1990s, but has continued to slowly evolve through recent years. In one of the earliest studies, Rockart *et al.* (1982) report on a project initiated by the Society for Management Information Systems to define a model of the information systems executive of the 1980s. The report notes that the IT function evolved from an earlier emphasis on handling historical accounting data only to computer-based systems that are integrated throughout day-to-day operations of the organisation. This shift is highlighted here as it actually represents a critical juncture in the move of information systems away from an accounting and accounting information processing focus to a broader systems perspective that initiated a systematic evolution through operational process support to tactical decision making support to ultimately a strategic orientation. Rockart *et al.* (1982) begin to shape the concept of an information systems executive (*i.e.*, CIO) that was more of a manager than a technician. Follow-up work by

Benjamin *et al.* (1985) provided support for the projections of Rockart *et al.* (1982) as a small survey indicated a shift in CIO responsibilities through decentralisation of line responsibilities leading to more of a coordination role, a greater emphasis on staff management, and more responsibility for information resource policy and strategy.

Still, a later analysis of CIOs indicated that the predominant CIO prototype continued to be a technician-oriented individual in the early 1990s. At the point of this survey, established CIOs had consistently spent the majority of their career within the IT function. However, two-thirds of newly hired CIOs had more than five years experience managing non-IT divisions during the prior 15 years (Applegate and Elam, 1992). This survey provides the first evidence of a shift towards management-oriented CIOs.

This evolution is also evident in another study that focused on successful CIOs to identify their characteristics. The results of this latter study indicated that successful CIOs operated as executives rather than as functional managers, were active participants in strategic planning, and acted as facilitators in drawing together IT staff, functional area managers and staff, and external entities that were impacted by IT projects and systems. Thus, the early 1990s represent an inflection point where the CIO appears to make the transformation from a technical orientation to a management orientation.

The past decade has unveiled a growth in the management and business orientation of the CIO as well as the IT function as a whole. Studies have increasingly focused on the need for (Lee *et al.*, 1995) and attainment of (Bassellier and Benbasat, 2004) increased levels of business acumen, business process integration, and interpersonal/communication skills. In successful organisations, the IT function as a whole has evolved to a business function rather than a technical function.

As the IT function has evolved and matured, the focus of the CIO has similarly continued to evolve. The successful CIO has come to be viewed as an effective manager who can leverage the IT function at the organisational level and provide a convincing and persuasive partner in the overall organisation management team (Feeny *et al.*, 1992; Enns *et al.*, 2003; Luftman and McLean, 2004). In short, the focus has shifted from being an effective strategic manager of the IT function to effectively interacting with other top management representing other key functional areas of the organisation and to relate to each of these areas in a manner that will garner appropriate support and funding for the strategic goals of the IT function.

This evolutionary look at the CIO and the IT function is not revolutionary by any means, but it is critical to understanding the next shift in the CIOs role. Essentially, we have seen two eras for the lead IT executive. In the first era as IT established itself and became engrained in the operations of the organisation, the CIO (or equivalent) was primarily focused on the technical aspects of IT and the acquisition, development, and implementation of hardware and software to support day-to-day operations. In the second era, the CIO evolved into a manager that could effectively integrate the IT function into the strategic objectives of the organisation and provide a key role in the overall management of the organisation.

Arguably, the CIO is now entering the third era. In this era, the IT function is shrinking rather than growing, the outsourcing of IT activities becomes a vital component of the IT plan, and the CIO to a certain degree must become more of a risk management expert. The impact of the Sarbanes-Oxley Act is to escalate the momentum behind this shift and to force the CIO to become much more aware of enterprise risk and the related

internal controls that are, or should be, in place to keep an organisation successfully on track and at minimum risk of disruption from external threats. This third era of the CIO is examined more closely in the following section.

#### **4 The evolving role of the CIO**

The shift in the CIO's role can be marked to a certain degree by the end of the massive ERP integration effort and the passing of the year 2000 (Y2K) concerns over projected widespread systems collapse. Many of the ERP systems were implemented with barebones or even zero internal control integration into the processes. The early 2000s saw a wave of after-implementation consulting activity focused around integrating the control structure into the ERP system. Additionally, a general concern over corporate governance brought awareness of governance practices and issues to the major functional areas within the organisation.

The result has been an emerging focus on IT governance – the first sign of the emerging third era of the CIO. Sambamurthy and Zmud (1999) speak of IT governance in terms of the organisational structure. They note the three primary approaches to IT governance:

- 1 centralised
- 2 decentralised
- 3 the federal mode.

The first two are fairly self-explanatory. The federal mode is a blended approach where both the IT function and the business functions assume authority for specific spheres of IT activities. This blended approach has evolved as the governance structure of choice for many organisations (Scalet, 2005).

This view of IT governance is not particularly new, dating back some 20 years in the literature. Rather, the reemergence of the discussions and the use of the IT governance terminology are more symbolic of the arising focus. Weill (2004) delves into the IT governance issue in more detail examining the components that should be dealt with separately in setting governance structures – namely input rights (*i.e.*, rights to provide input and feedback on IT decisions) and decision rights (*i.e.*, determining IT principles, IT architecture, IT infrastructure strategies, business application needs and/or IT investment, and prioritisation). Weill also expands upon the types of governance structures. Again, the framework for governance is not as critical as is the apparent focus on IT governance as an increasingly critical issue.

The research to date only brushes the bigger governance issues. The complexity of IT governance structures are escalated through the use of outsourcers, Application Service Providers (ASPs), and dependencies across supply chains. How does an organisation govern and control operations that are performed by an outsourcer that might be halfway around the world? What if there is a business interruption? Recent reports of terrorists targeting India's outsourcing industry with intent to bomb the outsourcing facilities (Ribeiro, 2005) should have made more than one CIO take pause. The same issues arise with ASPs. ASPs get particularly scary when considering what happens if the ASP suddenly shuts down business, and they are running a critical application (*e.g.*, an ERP system that is supporting the financial reporting, manufacturing, and logistics functions)?

There are a myriad of other issues surrounding ASPs that should be carefully considered, monitored, and controlled through the CIO and the IT function (*e.g.*, Kern *et al.*, 2002). The issues with e-commerce partners, particularly in tightly coupled supply chains operating in a just-in-time mode, are again similar. If a supply chain partner has an interruption or ceases operation, how does the remainder of the supply chain organisations continue to function? Who monitors the risk from e-commerce partners to the organisation and to the connected systems? Risk management of these relationships is critical (*e.g.*, Arnold *et al.*, 2004).

Along with the focus on corporate governance has come a broader discussion on enterprise risk management. Enterprise risk management focuses on the broad strategies, policies, and procedures that are in place to monitor, assess, and evaluate risk to an organisation's continued operations. Many of the threats in today's environment arise from external technology linkages and electronic data storage. These threats range from outside perpetrators that attempt to attack or gain access to systems and data to viruses that attempt to destroy data or slow processes to business partners that inadvertently cause damage to systems during communication linkages or fail to protect shared data. Some would argue that the CIO is in the best position to champion enterprise risk management and should take a leadership role in this area (*e.g.*, Holmes, 2005).

This brings the discussion back to the Sarbanes-Oxley Act and its impact on the CIO function. The preceding discussion highlights the environment that was already taking shape even before the Sarbanes-Oxley Act was passed. Corporate governance and risk management were already arising as key strategic issues for most organisations. The Sarbanes-Oxley Act has given governance and risk management a strong push to the centre of corporate focus and moved the discussion from high-level organisational directives to the detail-level implementation plans that will allow successful attainment of the mandates of the Act.

Not all buy in to the idea that Sarbanes-Oxley raises the profile and importance of the CIO. Koch (2004) notes that the overall results from two different surveys indicate that only 50–63% of companies have IT representation on their Sarbanes-Oxley compliance steering committees. Rather, the steering committees have been dominated by CFOs and internal auditors. A third survey found that 72% of compliance teams were led by finance and only 4% by IT. At the same time, Sarbanes-Oxley compliance work has drained budgets and dominated the work being completed by IT groups.

However, others note that this may be a short-term effect of trying to achieve compliance in the first year through essentially brute force – throwing a huge labour effort at the problem (*e.g.*, Worthen, 2005). Projections are that 2005 is the year that organisations focus on simplifying the process and throwing a huge labour effort at the reporting effort, while 2006 and 2007 become the years that CIOs guide the automation of the documentation and reporting processes.

The net effect is that the CIO will be inextricably linked to the Sarbanes-Oxley Act efforts. Beyond Sarbanes-Oxley, the CIO will also need to face issues surrounding increasing privacy legislation that requires reporting of breaches and leaks of customer information, health information privacy guidelines, and an array of other regulatory requirements such as occupational and environmental that must be reported within days of identifying an occurrence of a negative event. The CIO has little choice other than to become a key participant in the governance and risk management process – and seemingly a leader in both areas.

## **5 Re-thinking CIO research: some concluding thoughts**

To this point the focus has been on describing the evolving environment of the CIO and increasing the understanding of the substantial shift in the role of the CIO that is currently taking place. The by-product of this exposé should be to highlight the need for additional research into the role, skills, and knowledge of successful CIOs who are operating in this new environment of IT governance, enterprise risk management, and detailed internal control reporting. It is very likely that the results reported in the extant CIO literature are not representative of the environment in contemporary organisations as we enter the third era of defining the CIO.

The bulk of the CIO studies to date have focused on understanding the skills, knowledge, and role of successful CIOs. The skills and knowledge examined have largely focused on technical competencies and management competencies. These competencies may not carry over effectively into an environment that is more oriented towards governance, risk management and internal control integration, and monitoring. It may be a very different set of competencies that lead to success in this new era.

Similarly, the studies that have attempted to identify the importance external stakeholders place on CIO selections should also be revisited. That literature to date has had mixed results. For instance, Chatterjee *et al.* (2001) find a significant market reaction to the announcement of new CIOs using an event study methodology, but Guan *et al.* (forthcoming) find that this reaction is driven by firms that are not financial analyst tracked and that tend to be smaller. It is these smaller organisations that also are perceived to have the greatest challenge in meeting the requirements of the Sarbanes-Oxley Act. The issue should be reexamined looking at firms hiring CIOs in the period subsequent to the Sarbanes-Oxley Act being issued in order to better understand the importance placed on CIO hiring in this new era, the characteristics of CIOs that might be most valued by external stakeholders, and to understand if the characteristics of CIOs hired by organisations change in this new era.

Finally, as the reports start flowing in on companies' compliance with the Sarbanes-Oxley Act, consideration should be given to the differences in companies receiving adverse reports versus those receiving positive affirmations from their auditors on their internal control structures. Is there a difference between the two sets of organisations as to the participatory role of the CIO? Are there differences based on the background and expertise of the CIO? Are organisations that receive adverse reports more likely to replace their CIO? If so, do the new CIOs have different competencies than the replaced CIOs? Is there an impact from outsourcing or the use of ASPs within the IT function? Is there an interaction between the outsourcing and the CIO's competencies?

The issues identified here only scratch the surface on the research opportunities in studying CIOs. As we enter this new era of the CIO, it is important to understand the characteristics that lead to success and to consider how our education programmes can also be refined to better prepare IT professionals for this new environment. The skill set and knowledge needed at all levels of the IT function are likely very different in this new era.

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