



UNIVERSITY of LIMERICK

O L L S C O I L L U I M N I G H

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# How Internal Audit can contribute to the success of ERP implementation projects in an Irish context

by

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This thesis is submitted in part fulfilment of the requirements for the Masters in Project and Programme Management

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I declare that the material is entirely my own work and has not been submitted in support of an application for another degree or qualification of the University of Limerick or any other University or Institute of Learning; and where use has been made of the work of other people, it has been acknowledged and is fully referenced.

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## Abstract

The aim of this study is to explore how Internal Audit can contribute towards the successful implementation of ERP (Enterprise Resource Planning) projects in an Irish context. ERP projects are well documented for high failure rates and adverse impact on receiving businesses. Although there is limited literature available concerning the role of Internal Audit within ERP implementations, there is plenty available relating to ERP implementations which document risks, problems and critical success factors associated with these complex and business-critical projects. Results from the literature review show that there is no general agreement on which set of factors are key to success in ERP implementations which in turn places a greater emphasis on the ability of management to be able to deliver their agreed requirements which will differ from company to company.

Internal Audit is typically a centrally operated function within an organisation's system of Governance and Control and is recognised as having expertise in reviewing control environments. This includes ensuring that appropriate governance structures are in place and that effective risk management processes are actioned which in turn can mitigate problems occurring. In keeping with the evolving nature of internal auditing, auditors are constantly increasing their skillsets to enable them to independently review ERP projects and report issues in a timely manner for action by business management. It is the depth of investigation that is an integral part of an internal audit that realises most benefits and this became apparent in the additional success factors, risks and problem areas identified by the interviewees compared to the points documented within the ERP-related literature. The interview findings from the population of ERP experienced auditors show that the benefits of using them to review ERP projects have been positively acknowledged within their companies. In many cases audit reviews are now included as part of the project planning process.

## Executive Summary

ERP (Enterprise Resource Planning) projects involve a complex technical implementation intertwined with Business Process Reengineering / Business Transformation processes bringing about a significant change in the manner in which the business operates. ERP projects are well documented for high failure rates and adverse impact on receiving businesses. The purpose of this study is to explore how Internal Audit can contribute towards the successful implementation of ERP (Enterprise Resource Planning) projects in an Irish context.

The research strategy consisted of a literature review of ERP related articles concentrating on the identification of Critical Success Factors (CSFs) along with documented risks and problem areas encountered and their influence, both positive and negative, upon project implementations. The outputs gleaned from this review were used as input to semi-structured interviews conducted with experienced auditors who had either audited ERP implementations, or had been part of an ERP implementation team and were now working in an internal audit unit. This was to identify opportunities where internal audit can become involved and indeed, where internal auditors are already working with project teams across their organisations. An additional outcome of this process was the identification of additional success factors, risks and preventative controls that should be in place based on the experiences of the interviewed population.

Internal Audit is typically a centrally operated function within an organisation's system of Governance and Control. Internal auditors are bound by a code of conduct and guidelines on how to complete audits as defined by the Institute of Internal Auditors (IIA) and ISACA, who are the internationally recognised global associations for the Internal Audit profession. Internal audit is defined as *'an independent, objective assurance and consulting activity designed to add value and improve an organisation's operations. It brings a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control and governance processes.'* Additional research from the IIA has shown that *'board directors and internal auditors agree that*

*the two most important ways that internal auditing provides value to the organisation are in providing objective assurance that the major business risks are being managed appropriately and providing assurance that the risk management and internal control framework is operating effectively’.*

ERP systems affect the entire organisation and typically result in changes to business processes throughout that organisation. Although CSFs are well documented, the results from the literature review show that there is no general agreement on which set of factors are key to success in ERP implementations as their ranked importance varies from author to author. This reflects the differing business requirements between organisations. This general lack of commonality places a greater emphasis on the ability of management to deliver their agreed requirements and to ensure that the governance structures are appropriate and that project risks are identified and mitigated in a timely manner.

Although some projects identified in the literature had structures in place, problems arose through a lack of top management support and over-reliance on external agents combined with ‘misplaced’ self-efficacy of the project managers who were unwilling to acknowledge project failings and were convinced that they could ‘turn it around’. Lack of action on known problems resulted in their ‘migration’ from phase to phase which in turn caused more serious problems as the project progressed. The absence of independent, timely monitoring of project progress against expected deliverables negatively impacted upon the project. These weaknesses could have been addressed in a timely manner and could have been prevented had the projects in question implemented CSFs identified in the literature. The key CSFs related to top management support, project team competence, setting of clear goals and objectives, project management(including monitoring and evaluation of performance), effective communication, change management and vendor support/partnership.

A number of additional critical success factors were identified based on the experiences of the interviewees. These included the use of an independent quality assurance role to assist in the monitoring and management of the project, a robust risk and issue management process and clear succession planning to address the loss of experienced resources during

the project. Preventative actions were identified, and recommended to management, that if implemented would also assist in addressing these weaknesses. These included such areas as escalation and resolution mechanisms, continuous risk assessment, detailed planning involving both business and IT resources, allocating local expertise regarding contract management (rather than being dependent on the vendor supplied contract) and not underestimating the quality and level of business resources required. This links directly into ERP projects being business-led and not IT-led assignments.

The role of Internal Audit is evolving and auditors are acquiring new skillsets around IT and project and programme management. This is in addition to their business knowledge and risk management and control review expertise. The question of audit independence in an ERP implementation is addressed through having Internal Audit as a review-only role which can be done across all phases of the project. Internal audit can attend project meetings and advise on controls required and also inform the teams of previously identified weaknesses in other projects and the solutions found to address those. The cost of internal audit is typically allocated centrally so would not have an impact upon the actual project costs.

As stated during the interviews, if the project teams are aware that Internal Audit are reviewing the project on behalf of senior management / Audit Committee / Board of Directors then they may be more inclined to adhere to the agreed methodologies and communicate any potential problems / delays in a timely manner to ensure optimum reaction to address those weaknesses.

In companies where Internal Audit has been involved, there has been an improvement in identifying, in a timely manner, issues that could negatively impact upon the business. Management should consider using Internal Audit as an independent review resource to ensure that robust controls are built into the project management processes and that the projects are progressing in accordance with management / stakeholders expectations.

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## 1. Introduction

ERP (Enterprise Resource Planning) projects involve a complex technical implementation intertwined with Business Process Reengineering / Business Transformation processes bringing about a significant change in the manner in which the business operates.

*‘The implementation process of an ERP system is best conceptualized as a business project rather than the installation of a new software technology’. (Wong et al. 2005). ‘The Implementation of an ERP system is an extensive, lengthy and costly process, typically measured in millions of dollars. The investment is both in the software itself and in related services such as consulting, training and system integration...companies experience considerable problems particularly during the actual implementation phase’ (Parr & Shanks 2000), (Ngai et al. 2008).*

My research question is to investigate how Internal Audit can contribute to the success of ERP implementation projects in an Irish context.

Organisations implement ERP projects for a number of reasons including:

- Part of strategic planning to gain business advantage / keep up with competitors,
- Centralise functionality to realise cost savings / improvements in business processes
- Reduce internal costs, improve / integrate / develop common business processes
- Increase efficiency across the organisation / streamline organisational processes
- Improve reporting across the organisation through use of single database / information source with no duplication of data
- Improve customer service and support.

ERP projects are well documented for high failure rates and adverse impact on receiving businesses. Bradley (2008) citing (Davenport, (1998), and Nelson (2007)) found that there are numerous examples of failed and abandoned implementation projects such as: Fox–Meyer Drug, who argued that the ERP system implementation helped drive it into bankruptcy, Mobile Europe spent hundreds of millions of dollars on an ERP project only to abandon it when its merger partner objected, Dell found that its ERP system would not fit its new decentralised management model and Applied Materials gave up on its new ERP

system and related business changes when it found itself overwhelmed by the organisational changes involved. Nike's ERP implementation is included in a listing of “infamous failures in IT project management” because of a major inventory problem which resulted in a profit drop of \$100 million in the 3rd quarter of 2000. Davenport (1998) states that the single biggest reason that ERP projects fail is because companies are unable to reconcile the technology requirements of the system with their own business needs.

Problem areas identified in ERP projects, Wong et al. (2005), include over-reliance and mismanagement/conflict with system integrators/consultants, lack of communication between projects and business units within multi-national groups resulting in the same mistakes recurring, absence of appropriate business involvement and governance structures,(Grabski et al. 2001), lack of realisation that an ERP implementation is a business transformation programme and will impact upon many areas within the business. Markus et al. (2000) found that companies experience problems at all phases of the ERP system life cycle and many of the problems experienced in later phases originated earlier but remained unnoticed or uncorrected.

I propose to identify some of the better documented underlying causes for the issues outlined above and in so doing identify opportunities where Internal Audit can assist in helping business management to address them in a timely and controlled manner using the skillsets present within Internal Audit teams. As part of my research I sought to identify other problem areas that have been documented using both a literature review and interviews with specific Heads of Audit (or their designated representatives) in Irish companies.

## 1.1 Research Objectives

The research objectives that I investigated (and related back to an Irish context) were:

- To identify problems encountered during ERP implementations.
- To explore the corrective/preventative actions that were or should have been undertaken in order to redress the problems.
- To ascertain what the Critical Success Factors (CSF) were within those ERP projects and in contrast if there were any critical failure factors that impacted upon the delivery of the solution.
- To identify how Internal Audit has/can contribute in identifying / addressing problems and to identify phases where Internal Audit can provide most benefit to the ERP project.
- To seek opinion on the range of skills, competencies and experience that Auditors have / should have in order to maximise their value to ERP program success.
- To outline recommendations that organisations should consider based on the above.

## 2. Internal Audit Framework

The Institute of Internal Auditors define Internal Audit as

*‘an independent, objective assurance and consulting activity designed to add value and improve an organisation's operations. It helps an organisation accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes’.*

The role of Internal Audit has developed to address more than just the financial controls within an organisation, albeit that this is still a major focus of Internal Audit work. Internal Audit is becoming more involved across the business and are seen, in many companies, as a resource that can be utilised to review business transformation projects and related systems implementations as they are in progress rather than coming in ‘at the end’ where any control weaknesses identified would be more costly to fix.

ISACA<sup>1</sup>, the Global certifying body for IT auditors, has developed COBIT, a framework in which it details five principles that allow an enterprise build an effective governance and management framework based on a holistic set of seven enablers. These enablers help the organisation to optimise information and technology investment and use them for the benefit of stakeholders. COBIT version 5, issued in 2013, aligns with the latest relevant complementary standards and frameworks used by enterprises such as:

- Enterprise: COSO, COSO ERM, ISO/IEC 9000, ISO/IEC 31000
- IT-related: ISO/IEC 38500, ITIL, ISO/IEC 27000 series, TOGAF, PMBOK/PRINCE2, CMMI

The 5 COBIT principles are:

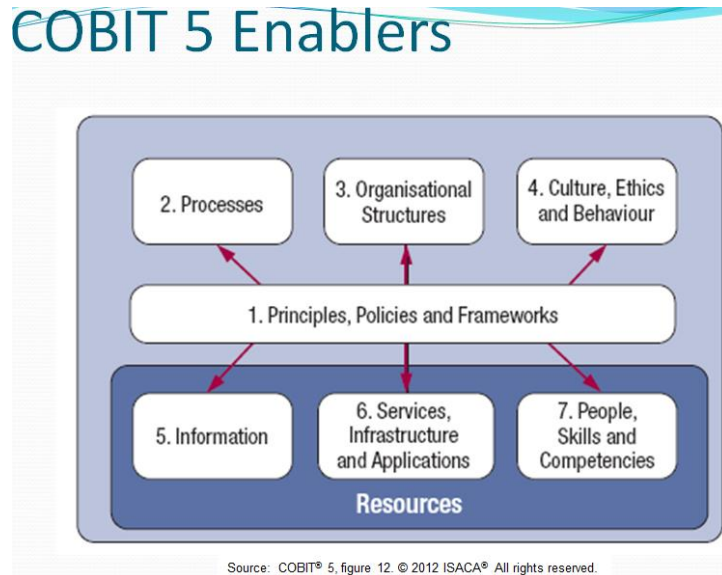
1. Meeting Stakeholder Needs
2. Covering the Enterprise End-to-end
3. Applying a Single Integrated Framework

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<sup>1</sup> ISACA, is an independent, non-profit, global association that engages in the development, adoption and use of globally accepted, industry-leading knowledge and practices for information systems. Previously known as the Information Systems Audit and Control Association.

4. Enabling a Holistic Approach
5. Separating Governance From Management

The COBIT enablers are:



*Figure 1 COBIT5 Enablers*

These enablers provide the basis for Internal Audit to develop audit work programmes that can be used as part of their involvement in the review and assessment of, for example, processes, methodologies, controls and Governance in ERP projects. This internationally recognised IT Governance framework is widely accepted across the Globe and is referenced, used and implemented by IT auditors (over 115,000 ISACA members worldwide) and IT professionals alike. Figure 2 below depicts the evolution and longevity of the ISACA COBIT framework from a purely audit focussed framework to more of a business controls and governance framework, as it services and assists the needs of IT Audit and IT Governance professionals within an enterprise.

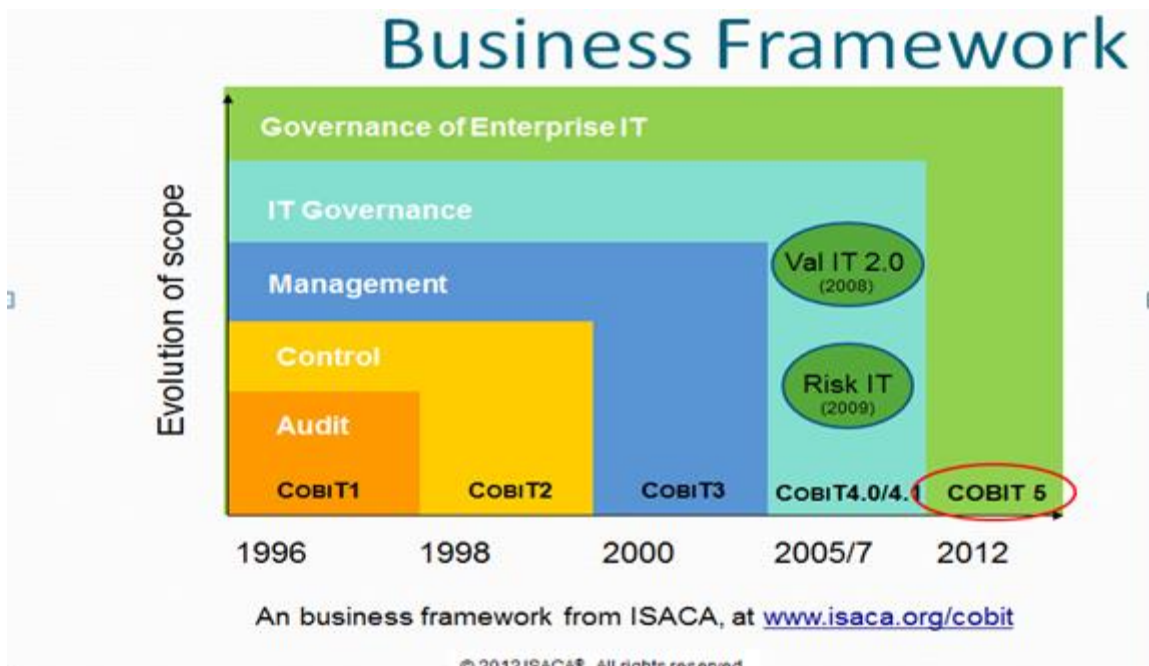


Figure 2 COBIT Business framework

Typically Internal Audit, within an organisation, has direct access to project/programme steering committees and company senior management. Ethically, under its professional code of conduct requirements, Internal Audit is required to maintain an independent view of the processes and projects that it is engaged in reviewing. In the context of reviewing ERP projects therefore, auditors must always maintain their independent reviewer/observer status and can never become involved in the project implementation or decision making processes. Internal Audit can thus be used as an independent resource by which management can assess and review project activities and documentation and receive independent reports on any issues and risks that may require mitigation or remediation. This essential and independent form of review can then give business and project management independent insight and assurance around project progress by identifying potential problems at various phases of an ERP project. On-going involvement of auditors results in timely identification of issues to management and can also ensure that project teams attend to risk and governance controls with more consideration, in the knowledge that Auditors will be on site and reporting on identified issues and problems.

Where necessary, significant issues and risks can be elevated to Audit Committee or Board level for additional consideration at an organisational strategic level and this often provides the impetus for change that is required in a troubled project.

As Internal Audit is typically a centrally operated function within an organisation's system of Governance and Control, the actual cost of Internal Audit resources tends not to be assigned to the projects so avoiding an extra cost burden on that project and maintaining Audit independence for the performing organisation.

As part of a typical Internal Audit review of a project there are a number of steps that need to be undertaken:

- Identify a project and understand the overall project objectives and methodology used and identify objectives and deliverables for each phase of the project
- Ensure audit skillsets are in place to undertake the assignment i.e. review guidance documentation relating to the methodology used e.g. PMBOK, Agile, Prince or any home-grown or hybrid approach.
- Undertake risk assessment to identify key risks impacting upon the achievement of those objectives
- Identify expected controls that should be in place to address those risks
- Test the effectiveness of those expected or identified in-place controls using, for example, documentation reviews and interviews of key control performers, project management as well as project sponsors, business subject matter experts and executive management
- Collect appropriate evidence to support audit observations, findings and conclusions
- Prepare an audit report to project management, steering committee, executive management and the enterprise audit committee. This is typically a sub-committee of the company Board of Directors.

As Internal Audit is part of the organisation under review, it is implicit that they understand the prevailing organisational and project culture and context.

ISACA issued guidelines relating to the audit and review of ERP systems(guideline G21, effective from 1 August 2003(ISACA Standards Board 2003)). This provides guidance on the roles and responsibilities of an Internal Audit unit and outlines how to achieve compliance with Information Systems Auditing standards throughout the audit process. This includes updating the central Audit Charter<sup>2</sup> to recognise the diversity of ERP implementations and also addressing the areas of auditor independence and competence(knowledge, experience and skill requirements). Planning processes, performance of work and reporting are also outlined within this guideline.

The Institute of Internal Auditors (2009) issued a position paper where it states that the role of Internal Audit relating to risk management is to provide independent, objective assurance to the board on the effectiveness of risk management.

*'Research has shown that board directors and internal auditors agree that the two most important ways that internal auditing provides value to the organisation are in providing objective assurance that the major business risks are being managed appropriately and providing assurance that the risk management and internal control framework is operating effectively'.*

The five types of business risks that can impact upon an organisation are all present within an ERP implementation. They are:

- Strategic risk - could prevent an organisation from accomplishing it's objectives
- Financial risk - could result in a negative financial impact to the organisation
- Regulatory (Compliance) risk - could expose the organisation to fines and penalties from a regulatory agency due to non-compliance with laws and regulations
- Reputational risk - could expose the organisation to negative publicity
- Operational risk - could prevent the organisation from operating in an effective and efficient manner or be disruptive to other operations.

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<sup>2</sup> An Internal Audit department is typically established and empowered under a formally documented and approved charter from the Audit Committee. This charter gives the Audit function right of access to systems, information, files and personnel across the enterprise as an implicit part of the fulfilment of its remit.



Internal Audit will have the skillsets to examine the risks and give an opinion on the adequacy of risk management and controls within the project. Thus, Internal Audit can be viewed as a management assistance tool, allowing decision makers in an entity to better manage its activities(Daniela & Attila 2013).

Although the overall objective and scope of an audit doesn't change in an ERP environment, due to the nature and complexity of ERP systems, the risk profile of that project is likely to increase, so Internal Audit should give more attention to those risks(Soral & Jain 2011). If the project employs a risk advisory group/quality assurance group(Hare 2011), then Internal Audit can provide an independent view on the effectiveness of that role within the project without the bias of being part of the team. Internal Audit have a different reporting line i.e. outside of the project management team.

As well as reviewing risk management, Internal Audit can review the governance structures in place, as well as checking on how the control environment utilised by project management has been designed, implemented and actioned. This can be done at each stage of the project to give management an independent view on progress to date. It is the specialist knowledge that Internal Audit as a unit possesses around these three areas in particular (risk management, governance and controls) that can assist project management in ERP implementations. In addition, if there are serious or critical failures or weaknesses uncovered by Internal Audit then they will inform senior company management, in a timely manner, that the project may not be in accordance with organisational expectations. It is then the responsibility of organisational senior management to decide on the next course of action e.g. termination, redesign, defer, allocate more resources, extend the project.

In summary therefore, there is a large body of IT Governance, Control and Management framework guidance available to IT and enterprise management. Included within that are several important references to the need for Auditors to be involved in the review of major business change programmes and the IT systems with which they are associated. These

involvements include the classic phases of Initiation, Planning, Execution, Monitoring/Control and Closure.

### 3. Literature Review

The available literature around Internal Audit involvement within ERPs is limited; however there is plenty of literature available concerning ERP implementations themselves. ERP projects are well documented for high failure rates and adverse impact on receiving businesses. Accordingly, documented problems encountered within ERP implementations were investigated and Critical Success Factors(CSF) identified to avoid/address such problems. In addition, where ERP projects were successful, their documented key success factors were identified.

The IIA definition above refers to Internal Audit's role in 'improving *the effectiveness of risk management, control, and governance processes*', so those aspects of ERP projects were examined. Within the identified literature, the use of an Internal Audit function to assist in ERP projects was also examined. From these outputs, Internal Audit's role and skillsets were related to the issues impacting ERP implementations and related business change projects to determine where Internal Audit can assist in the ERP process.

Bradley (2008, p178) citing Milford and Stewart(2000) observed that ERP systems differ quantitatively from prior large IT implementations in three ways: 1) ERP will impact the whole organisation, 2) employees may be learning new business processes as well as new software, 3) ERP is often a business-led initiative, rather than IT.

As ERP projects differ from traditional IT projects, in terms of their scale and impact on the organisation, then the first step in providing effective risk management is to identify the key risk differences between typical IT projects and larger scale ERP and business change projects.

### 3.1 ERP versus IT project risks

A number of studies have identified differences in risk factors between traditional MIS/IT projects and ERP projects. An ERP project is composed of software projects and business processes with tightly interlinked interdependencies(Huang et al. 2004). Implementations of ERP systems are one of the most difficult investment projects because of the complexity, high cost and adaptation risks(Tambovcevs & Tambovceva 2013).

Grabski et al. (2001) argued that the lack of realisation that an ERP implementation is a business transformation programme will impact upon many areas within the business.

Bradley (2008) citing Brown and Vessey (2003) stated

*‘although failures to deliver projects on time and within budgets were an old IT story, ERP held even higher risks – they could be a ‘bet-our-company’ type of failure’.*

ERP projects are interdisciplinary and affect interdependencies between business processes, software and process re-engineering(Aloini et al. (2007).

Sumner (2000) identified some unique risks facing ERP projects that make them different from other projects including:

- Failure to redesign business processes and to follow an enterprise-wide design which supports data integration resulting in the need to re-engineer the existing business processes to accord with the processes supported by the ERP software;
- Failure to adhere to standardised specifications supported by the software resulting in potential future problems when the core software modules are updated;
- Skill mix required not available ‘in-house’ resulting in having to reskill and/or recruit technology professionals and using external consultants and integrating their application-specific knowledge and technical expertise with the existing internal teams;
- The challenge of recruiting and retaining business analysts who combine the business and technology skills;

- Technology bottlenecks e.g. building interfaces to integrate legacy systems to/from the ERP modules resulting in cost and time overruns due to lack of integration and duplication of business processes.

To address these risks involves changing not only the underlying IT environment but also the business working processes and this in turn can have an impact upon the culture of the organisation, depending on if it is one of open communication or each section/department operates as independent units. Existing staff members may not embrace the new structures and systems if they consider that it is being imposed upon them, or that the consultants are now in charge and so are not perceived as working together with the internal company resources.

Another risk identified relates to the identification of Early Warning Signs(EWS) and subsequent mitigating actions within complex projects(of which ERP are included). Williams et al. (2012) found projects where EWS were recognised but were not acted upon in a timely manner resulting in knock-on problems later in the project. They discovered that a purely analytical approach was not always successful and that there is a mix of 'hard issues' (technical and more measurable) and 'soft issues'(people issues e.g. attitudes and values, harder to measure) among the EWS. They identified, among others, the lack of an outsider's perspective on the project, lack of consistency between stakeholders' ambitions, as well as more "gut-felt" signs, such as detection of unrealism and lack of clarity of thought as issues that should be addressed. This is an area in which Internal Audit can contribute to the project as they are independent, have ready access to all organisational stakeholders as needed and in general have been trained in interviewing and critical analysis techniques. They also understand the culture of the organisation and have access to upper layers of company and corporate management.

Ryan (1999) identified the requirement for new project management skills to enable the Project Manager(PM) to successfully manage an ERP project. These are specifically in the areas of awareness and knowledge of the business vision which links directly to ensuring the realisation of the overall corporate strategy. An ERP PM must understand both the business

and the technology and the impact that the new ERP system will have on that business and then work closely with the business managers to ensure a successful transition to the new environment. Additional areas that require an extra skillset dimension relate to testing and programme management and the ability to maintain an overview of all that is happening across the complex ERP environment and to be mindful of the interdependencies between the various aspects (business and IT) of a phased-release ERP implementation.

As ERP systems are very complex, high risk and will typically impact upon all areas of a business it is important that the PM builds trust across **all** impacted stakeholders during the project. Such groups can be regarded, in some cases, as similar to virtual teams, as the people involved report into different organisational structures / external consultancies and may only be available on a part-time basis to the project and can be based in a different location from the development project team. PM skills such as negotiating, delegating, directing, motivating, rapport building, empathy (including cultural intelligence) and conflict handling are very important here.

Once an ERP system is implemented, going back is extremely difficult (Bingi et al. 1999), as it is very expensive to undo the changes that an ERP system brings to a company, if indeed those changes can be reversed out. This is due to the pervasive nature of an ERP project as opposed to a single IT project that may impact upon only one aspect of the business. Accordingly a business needs to manage its ERP system as an on-going project. As such, managing an ERP project has been described as a “lifelong journey” (Michel & Vandenbosch (2000).

As Internal Audit are part of the company, their role as reviewer of the project can span the entire life of the project and may also perform further reviews when the project has ended, in the form of post implementation reviews and then later as part of the business-as-usual audit cycle. In the event that a project is cancelled, Internal Audit can be used as an independent resource to draw the reasons together and present the ‘learnings’ in an objective manner to enhance company project learning.

### 3.2 Risk identification in ERP projects

Risk management has been acknowledged as an important part of any project implementation, both across ERP and 'standard IT' projects. Risks are part and parcel of ERP projects but a planned and systematically adopted risk management procedure throughout the implementation can reduce the possibility of those risks occurring(Iskanius (2009). One explanation for the high failure rate in ERP projects is that managers do not take prudent measures to assess and manage risks involved(Huang et al. 2004).

Part of Internal Audit's role, therefore, is to examine the risk management processes in place and to check that risks have been identified and are being mitigated. Internal Audit also check that such documentation as risk registers are in place and being reviewed on a regular basis to ensure that risks are constantly addressed and also, as the project progresses, that new risks are identified and managed.

The major risks that Grabski et al. (2001) identified in ERP projects relate to:

- A. lack of alignment between organisation strategy, structure and processes with the chosen ERP application;
- B. loss of control over the project due to project team decentralisation of decision-making / lack of management oversight of decisions made by that project team;
- C. project complexity with a wider project scope than most other IT implementations;
- D. human factors - lack of in-house skills(project management, change management, Business process re-engineering, specific technical knowledge);
- E. changes in relationships within the company - changes in working practices leading to user resistance.

Aloini et al.(2007) identified, from a literature review of 75 articles, four ERP failure classifications:

1. Process failure, when the project is not completed within the time and budget
2. Expectation failure, when the systems do not match user expectations
3. Interaction failure, when users' attitudes towards project are negative

4. Correspondence failure, when there is no match between ERP IT systems and the planned objectives.

The authors identified their top 10 risk factors, from their literature review as:

**Top 10 risk factors**

Risk ID	Risk factor	Total number of recurrences
R1	Inadequate ERP selection	36
R18	Ineffective strategic thinking and planning strategic	31
R10	Ineffective project management techniques	27
R9	Bad managerial conduction	24
R11	Inadequate change management	24
R6	Inadequate training and instruction	24
R2	Poor project team skills	23
R8	Inadequate BPR	22
R3	Low top management involvement	20
R5	Low key user involvement	19

Their list is similar to Grabski where for example: A relates to R1,R8,R18, B relates to R3, R9, R11, D relates to R2,R5,R6,R10. Project complexity and relationship changes are not specifically mentioned by Aloni et al. in their Top10.

Jani (2008) examined the role of the PM in addressing risks within projects(albeit IT related) and found that they can have a negative impact upon the project through lack of project leadership and staff motivation. The influence of the PMs self-efficacy can also have a negative impact if, for example, the project is failing but the PM may continue to believe that they are in control and can 'turn it around'. This can lead to delays in terminating the project and result in financial loss to the company as more resources would be used without any positive outcome for the company.

Although there are some similarities between the lists above, the order differs between them and there are some differences between each of their listings. This is not surprising as each author used different sources and each of the interviewees contacted by them would have had their own particular bias/views in relation to the main risks that need to be addressed.

These identified risks need to be managed across the ERP project life cycle and will involve organisational as well as project management personnel.



Internal Audit can assist management in reviewing these defined risks and ensuring that they are being addressed in a timely and continuous manner. As part of the interview process undertaken in the fieldwork for this paper, the risk factors that my sampled population derive were checked and compared to the above points.

### 3.3 Problems encountered

Having identified the major risks within ERP implementations from the literature review, the next stage was to check where problems were typically encountered. Umble et al. (2003) found that the greatest enterprise system implementation failures seem to occur when the new technology's capabilities and needs are mismatched with the organisation's existing business processes and procedures. Too often ERP adopting companies fail to understand the business requirements which the ERP systems are expected to solve (Ehie & Madsen 2005). This relates to Grabski risk "A" above.

In identifying critical failure factors Wong et al. (2005) summarised failures into what they consider to be three common critical failure factors:

- Poor consultant effectiveness,
- Poor project management effectiveness
- Poor quality of business process re-engineering including inadequate top management support linked to the mismatch between the proposed ERP solution and the actual organisational needs.

Bingi et al. (1999) also identify the lack of top management commitment throughout every step of the ERP project as a critical issue. Somers & Nelson (2001) found that

'project failures show that project cancellations occur when senior management delegates progress monitoring and decisions at critical junctures of the project to technical experts'.

This highlights the importance of top management commitment and support and the use of appropriate skillsets required at the management level of the project team, i.e. must have a mix of technical and business knowledge. These link to Grabski risks "B", "D" and "E".

Chen et al. (2009) looked at common problems associated with ERP implementations from a project management perspective and found scope creep, poor risk management, inadequate allocation of human resources, poor communication and poor vendor management. These arose from weaknesses within the organisation in top management commitment resulting in short cuts taken in vendor selection, scope definition and overall planning. Resources with appropriate skillsets were not included leading to a lack of co-operation from business units and overall user resistance to the new system. Regulatory concerns were also absent from the planning process. These issues are symptomatic of the lack/absence of management around the risk of strategic misalignment and a lack of top management knowledge and oversight across all aspects of the project.

Venugopal & Rao (2011) found that although the structures for an ERP implementation were in place they were not actioned. There was a lack of visible top management support along with lack of appropriate skills and commitment within the team (many part-time resources) and absence of proper scope definition with appropriate input from the business. In addition the project team was headed by an IT manager and not a sufficiently senior business manager who would have the power to influence the course of the project and ensure timely allocation of appropriate resources. The above points link to Grabski risks "B", "D" and "E".

ERP implementations are about people not just processes or technology (Bingi et al. 1999). Human factors e.g. inter-departmental conflicts, vendor conflicts, user resistance to change, poor communications, lack of monitoring are stated as contributors to lack of success in ERP implementations (Wong et al. 2005) (Venugopal & Rao 2011). Managing user expectations at the start and then continuously throughout the project has been identified by Petter (2008) as crucial for software projects which are an inherent part of an ERP implementation. She identified three general strategies for managing user expectations – user involvement, leadership and trust. Areas not specifically mentioned relate to decentralisation of the teams (using in effect, virtual teams) particularly in multi-national environments where the solution will be applied across a number of countries/companies and the organisational and national

cultures that may be in place across those groups. Building trust is a vital element in such an environment but lack of trust, in itself, is not explicitly mentioned.

Markus et al. (2000) differentiated three phases in the 'ERP experience cycle':

*'(1) the project phase during which ERP software is configured and rolled out to the organisation, (2) the shakedown phase during which the company makes the transition from 'go live' to 'normal operations' and (3) the onward and upward phase during which the company captures the majority of business benefits (if any) from the ERP system and plans the next steps for technology implementation and business improvement.'*

Within the project phase they found major problems related to system integration, software modifications, quality of consultants and staff turnover. They concluded that problems encountered within the shakedown phase were caused by problems that previously occurred at the project phase but were not recognised as problems, such as: inadequate testing, scope changes, cutting end-user training, underestimating data quality problems and reporting needs, not improving business processes prior to implementation and approaching ERP from an excessively functional perspective (module by module independently) and not cross-functional. Within the onward and upward phase, problems were 'carried over' from the previous phases, e.g. data migration problems. In addition, organisations did not have a culture of managing business results and did not collect and use metrics and did not set and then demand business improvement. A lesson they concluded is that ERP benefits are not automatic and require human and organisational learning and focussed management attention.

The above issues point to an underlying absence of an effective governance structure for the projects. An effective governance structure would enable business needs/objectives to be evaluated, directed and monitored at the highest level in a timely manner which then 'feeds' down to the project management level, who will plan, build, run and monitor progress.

This is an area that forms part of an auditor's role in reviewing projects, from a risk perspective, at each stage during project progress as well as a post implementation review when the project has been completed. This can assist in the lessons learned aspect of the

project which can then be applied during the planning process for future projects. This is an area included in the interview process.

Internal Audit meets with various users and stakeholders across the project and ascertains their involvement along with their views on the leadership and trust relationships within that project. From experience, the outcomes of these meetings are always held in strictest confidence and results are anonymised and combined so that they cannot relate back to individuals. This often leads to a more open discussion which materially increases the effectiveness and value of the audit process.

### 3.4 Critical Success Factors (CSF)

The CSFs identified in the literature are the results of the authors' review of existing literature and responses obtained from their interviews and surveys undertaken with organisations that had ERP implementation experiences. Although many of the authors had more than 10 CSFs, for the purpose of my research I restricted the areas to the top 10 CSFs identified by each of the authors and listed them in Table 1 below. There are more than 10 in the list which demonstrates the differences in opinions found across the literature reviewed.

	Critical Success factors	Cited by:
1	Top management support	Somers & Nelson (2001), Akkermans & Van Helden (2002), Parr & Shanks (2000), Bradley (2008), Ngai et al (2008), Umble et al (2003), Nah et al (2003), Carton et al (2007), Ehie and Madsen (2005), Finney & Corbett (2007), Ara & Al-Mudimigh (2011) Maditinos et al (2012)
2	Project team competence	Somers & Nelson (2001), Akkermans & Van Helden (2002), Parr & Shanks (2000), Bradley (2008), Ngai et al (2008), Umble et al (2003), Nah et al (2003), Carton et al (2007), Finney & Corbett (2007), Ara & Al-Mudimigh (2011)
3	Project champion	Somers & Nelson (2001), Akkermans & Van Helden (2002), Parr & Shanks (2000), Bradley (2008), Ngai et al (2008), Nah et al (2003), Finney & Corbett (2007), Ara & Al-Mudimigh (2011)
3	Clear goals and objectives	Somers & Nelson (2001), Akkermans & Van Helden (2002), Parr & Shanks (2000), Ngai et al (2008), Umble et al (2003), Nah et al (2003), Carton et al (2007), Finney & Corbett (2007)
3	Project management (including monitoring and evaluation of performance )	Somers & Nelson (2001), Akkermans & Van Helden (2002), Ngai et al (2008), Umble et al (2003), Nah et al (2003), Ehie and Madsen (2005), Finney & Corbett (2007), Ara & Al-Mudimigh (2011)
3	Effective Communication (interdepartmental/ Knowledge Transfer)	Somers & Nelson (2001), Akkermans & Van Helden (2002), Ngai et al (2008), Nah et al (2003), Carton et al (2007), Finney & Corbett (2007), Ara & Al-Mudimigh (2011) Maditinos et al (2012)
3	Vendor support / use of consultants	Somers & Nelson (2001), Akkermans & Van Helden (2002), Ngai et al (2008), Bradley (2008), Carton et al (2007), Ehie and Madsen (2005), Finney & Corbett (2007) Maditinos et al (2012)
8	Organisational Change management programme	Parr & Shanks (2000), Ngai et al (2008), Umble et al (2003), Nah et al (2003), Finney & Corbett (2007), Ara & Al-Mudimigh (2011)
8	Business Process Re-engineering /ERP Integration	Bradley (2008), Ngai et al (2008), Nah et al (2003), Ehie and Madsen (2005), Finney & Corbett (2007), Ara & Al-Mudimigh (2011)
10	Training quality and quantity	Bradley (2008), Umble et al (2003), Carton et al (2007), Ehie and Madsen (2005), Finney & Corbett (2007)
11	Careful package selection (Feasibility/evaluation of ERP)	Somers & Nelson (2001), Akkermans & Van Helden (2002), Umble et al (2003), Ehie and Madsen (2005)
12	Management of expectations	Somers & Nelson (2001), Akkermans & Van Helden (2002), Bradley (2008)
12	Software development, testing and troubleshooting	Nah et al (2003), Ngai et al (2008), Ara & Al-Mudimigh (2011)
14	Interdepartmental co-operation	Somers & Nelson (2001), Akkermans & Van Helden (2002)
14	Empowered decision makers	Parr & Shanks (2000), Finney & Corbett (2007)
14	Vanilla ERP	Parr & Shanks (2000), Carton et al (2007),
17	Implementation Strategy and timeframe	Finney & Corbett (2007)
17	Smaller scope	Parr & Shanks (2000)
17	Deliverable dates	Parr & Shanks (2000)
17	Steering committee	Bradley (2008)
17	Cost/budget analysis	Ehie and Madsen (2005)
17	Data Accuracy	Umble et al (2003)
17	Multi-site issues	Umble et al (2003)

Table 1: Top 10 Critical Success factors by author.

Strong top management commitment and support(incorporating effective leadership) was cited most often and was required in all phases of projects. This is an area that Internal Audit can independently verify through its relationship with company top management, the Board and the Audit Committee. Ngai et al. (2008) undertook a literature review of ERP implementations across 10 countries and found that

*'there is no general agreement on which set of factors are key to success in ERP implementations'.*

As can be seen in Table 1 there are differences in the top 10 CSFs between the authors which reflect the differing approaches undertaken by them. Some had just a literature review (e.g. Ngai et al.(2008), Finney & Corbett (2007), Ara & Al-mudimigh (2011)) while others used a literature review followed by interviews with various companies (e.g. Nah et al. (2003), Akkermans & Van Helden (2002), Maditinos et al. (2012)). Others used CSFs from previous reviews and then applied these to case studies within organisations (e.g. Parr & Shanks(2000), Umble et al.(2003), Carton et al. (2007)). In some cases the organisations' experience and expertise in ERP implementations impacted upon the CSF identification as they previously had a failed project and were able to learn from these to later achieve a successful implementation.

Parr & Shanks(2000) and Somers & Nelson(2001) looked at each phase of a project and identified CSFs for those phases. Somers & Nelson (2001), based on their obtained responses from 86 organisations, identified their 'top5' factors. It can be argued here that the Pareto Principle(80/20 rule) can apply as if you can succeed in 'top5' (20%) you can gain the most value towards a successful ERP implementation. It is interesting to note here that the 'top5' factors in each stage were different and did not match up with their overall 'top5' discovered which were: top management support, project team competence, Interdepartmental co-operation, clear goals and objectives and project management. This shows that the importance of CSFs can vary between project phases.

Parr & Shanks (2000) presented their Project Phase Model (PPM) in which they determined the CSFs within three phases (Planning phase, Project Phase, Enhancement phase) and applied them to two case studies. The planning phase was considered the most critical for both companies with top management support, project champion, effective change management and vanilla ERP approach the most important. The project phase showed additional CSFs around project team competence were required. Interestingly the companies view was that the CSFs were of minor or no importance to project success for the enhancement phase.

Akkermans & van Helden (2002) used the CSFs identified by Somers & Nelson (2001) and looked for interrelationships/causal linkages between their defined 'Top 10' CSFs using a case study of two projects in the aviation industry. The authors identified that the first project had a lack of co-operation due to ineffective interdepartmental communication. In addition there was a strong project management emphasis on the technical side of the implementation rather than a business focus, resulting in a negative impact upon user expectations and lack of clear goals and objectives. By addressing the causes of these problems using the 'Top 10 CSFs' the second project had a greater chance of success. Similarly, Parr and Shanks (2000) were able to identify where problems arose between two projects in the oil industry where CSFs were not consistently followed. In the failed project they found that only one CSF was considered necessary by the company for all phases (management support) while in the later successful project they found seven CSFs that were required for all phases (Table 1 numbers 1,2,3,4,8 and 14(x2)).

Bradley (2008) examined eight projects as part of his research, four of which were successful. He defined project success as organisational improvement delivered on time and on/under budget. His findings suggest that choosing the right full-time project manager, training all personnel and the presence of a champion relate to project success. The use of consultants, the role of management in reducing user resistance and the use of a steering committee to control the project do not appear to differentiate successful and unsuccessful

projects. He found that the integration of ERP planning with business planning, was not found to be a critical factor for success. However, this differs from the conclusion of five other authors that identified this CSF as critical, see Table 1 above and also the major risks identified by(Grabski et al. 2001).

Ehie & Madsen(2005) found a strong correlation between successful ERP implementations and six factors they investigated: business process reengineering (planning), feasibility and evaluation of ERP project in the firm, top management support, consulting services, project management principles and cost/budget issues.

Carton et al. (2008) (p113) examined a successful ERP implementation in a company under nine headings of the PMBOK framework. They found that the competencies identified during the project changed as the project went live and they concluded that the rationale for ERP project implementations is not a static business case showing a monetary return over a number of years, but is more closely linked to the company's values and the impact that it has on those values. Markus et al. (2000) make the point that

*'researchers and companies will do well to adopt broad definitions and multiple measures of success and pay particular attention to early identification and correction of problems'.*

The latter is a role that Internal Audit can provide as part of their timely review work of ERP projects.

From the identified risks and problems encountered, adoption of the CSFs by the particular projects could have assisted in addressing problems encountered in a timely manner. A strong governance structure within the company feeding down into the ERP project is critical for success. This will include such areas as: top management support, team structure and competence(both business and IT), monitoring of progress at each stage of the project. This is an area where Internal Audit can assist management in reviewing the structures in place.



### 3.5 Internal Audit involvement

In reviewing where Internal Audit could get involved, Sumner (2000) stated that in order to minimize problems it is essential to look for opportunities for using external feedback to recognize the problem and then redefine it. This is particularly relevant to where a project may be in difficulties and the tendency is to 'save face' and keep pouring resources into such a failing project. External(not part of the project) independent feedback can remove the 'emotion' from the issue, as project management and teams and sponsors often have an emotional tie to the project and see it as their project. By using Internal Audit in this independent feedback role the company can keep any 'findings' in-house and so have more control over reporting lines and also the speed at which any issues will be addressed.

Grabski et al. (2001) argued that as audit teams minimise the risk of audit failure through identification of inherent risk, control risk and detection risk, that the same rationale can be applied to ERP implementations by identifying, controlling and minimising major business risks in the first instance. Internal Audit's involvement in the ERP system implementation also helps ensure the adequacy of controls and that all parties are performing the appropriate tasks in a timely manner (Glover et al. (1999)). Jani (2008) made the point that although the past experience of project managers with similar projects can be informative, they should not allow that to exert undue influence on the new project. Accordingly, they should rely on other sources such as auditors to get an independent assessment on the degree to which the project is under control.

Gallegos (2005) identified a number of key areas for auditors to understand and monitor where integration and implementation issues often arise in ERP projects. They are: corporate culture, completing business process changes, enterprise communication, management support, ERP project manager and team competence, project methodology, training and institutional commitment to change. Auditors should include these areas as part of their ERP project review and build their testing plans accordingly into their audit work programme. By examining these areas the auditor is covering the CSFs that have been

identified and this, combined with ongoing risk review, should assist management in their ERP project. However, it is management's responsibility to ensure that any issues raised are addressed in a timely manner. Due to the practical nature of an audit, it is incumbent upon the auditor concerned to ensure that the test plan used is appropriate not only for the particular ERP project but also for the particular stage that the project is currently at.

Madani (2009) argued that Internal Audit has expertise in risk management and has a big-picture perspective of the organisation's business operations. He refers to Internal Audit as an 'ERP expert' and so should be involved in all stages of the project. However he states that Internal Audit should in effect design the controls required. This is not in accordance with Internal Audit's independence stance which must take precedence. Internal Audit can advise on the controls required and examine if they are working correctly but management must design, own and implement them. This approach will not impact upon the ability of Internal Audit to keep senior management apprised of progress and the related risk and control environment.

Sayana (2004) reflected on the areas that Internal Audit should address as part of a governance review. Typically at the initiation stage Internal Audit should check on plans, objectives, expected gains and benefits, scope definition, metrics defined to monitor project progress and project governance structure. Internal Audit should follow up midway through the implementation to ensure that progress is as planned, scope has not been diluted or increased and critical business needs are still to the fore. Inquiring of management and project stakeholders should be done along the way to get a sense of their satisfaction with the project. On completion, Internal Audit should undertake a post implementation review around project deliverables and independently assess if the project goals were achieved. Internal Audit will check on the support provided as part of the project hand-over to the business into the business-as-usual environment.

### 3.6 Summary

The problems identified by the authors in the literature review could have been addressed through the timely use of a detailed risk management process including risk identification, assessment and mitigation. In addition a comprehensive and effective governance structure should also have been implemented. In some cases the structures appeared to be in place but were not effective as there was an absence of oversight and monitoring of the actions that should have been delivered as part of the projects. The lack of specific PM related skills both in-house and external (consultants) were also a major issue with non-successful ERP projects. The implementation of the 'top10' CSFs as outlined by the various authors mentioned above would assist in addressing the risks and so potentially prevent some of the problems occurring and were proven to do so in some of the documented cases.

My research question is to investigate how Internal Audit can contribute to the success of ERP implementation projects in an Irish context. A number of authors state that Internal Audit can be used particularly as an independent reviewer especially for risk management and also for giving feedback relating to potential project failures where the project team are too close to it and are unwilling/unable to acknowledge that the project will fail.

It is part of the 'job description' of Internal Auditors to review risk management along with governance and control environments within their respective companies. Accordingly, the areas that need to be investigated with Internal Audit personnel here relate to their views on:

- the use of the audit framework to address the issues raised
  - their awareness and views on the CSFs outlined
  - the risks identified and problems encountered
  - preventative measure that can be implemented
  - whether they have the required skillsets in place to assist the company as part of an ERP implementation.

#### 4. Research Design and Strategy (Methodology)

My research question is to investigate how Internal Audit can contribute to the success of ERP implementation projects in an Irish context. In order to establish this, I obtained the views of a selected group of Heads of Internal Audit in Ireland (or their designated representatives). The starting point for this selection was their membership of the Audit Directors Roundtable, Heads of Audit group. This selection was based upon major Irish companies that had completed ERP projects in the past or were currently going through an implementation. From this list I narrowed the interviewees to those that had either audited an ERP implementation, or had been part of an ERP implementation team and were now working in an internal audit unit.

The philosophy that I used for this research project was principally based on Interpretivism/constructivism - socially constructed, subjective, may change, focus on details of situation, the reality behind these details. I used a qualitative approach to data collection taking cognisance of the time-lines in which I had to operate. This philosophy links into my approach of using semi-structured face-to-face interviews with selected Heads of Audit (or their representatives) to gather information. I prepared an agenda for the interviews, based on an analysis of the existing published literature. Literature review and use of interviews have been used by a number of authors writing on aspects of ERP implementations (Ehie & Madsen 2005), (Markus et al. 2000), (Adam & O'Doherty 2000).

The areas addressed using information from the literature review, within the interviews were:

- Critical Success factors - each informant's opinion regarding CSF importance in a three point scale (Critical, important, no impact) and then what they consider to be their top10.
- Problems encountered - at what stage(s) of the project would these have an impact upon successful implementation
- Preventative actions that should be taken.

In addition, they were encouraged to include any other factors that they consider critical based on their auditing experience taking cognisance of the Internal Audit framework.

Other interview areas related to their opinions on:

- Internal Audit's role in an ERP
- where Internal Audit should be involved
- the benefits of internal Audit involvement
- the risks they see in having Internal Audit involved and how to address them
- the skillsets required by internal Audit teams to fulfill their role in ERP projects.

I circulated the interview topics in advance along with the rationale for each area to be discussed. This enabled the informants to think about what they might say in response. Each interview lasted between 45 minutes to 1 hour. I informed the interviewees that they were welcome to include any other factors they consider relevant. This enabled the identification of areas that were not specifically included in the literature. Using semi-structured interviews gave the interviewees the opportunity to expand on particular areas and in so doing gave me a better understanding of the background to their views, for example, based on their experiences at their present company, past experiences from their career, their general knowledge around the subject.

I took notes and confirmed back with the interviewees that the documented content accords with what they intended to say. I used this to address the impact of personal bias as I interviewed people who work in the same profession (Internal Audit) as I do and I needed to be certain that the points documented are theirs and are not influenced by my interpretation of what they say. I looked for any similarities and differences between the respondents and checked the reasoning behind the views expressed. I recorded all of the answers in tabular form and merged the data together to form a complete record of all of the information gathered under each of the headings. Due to the sensitive nature of the data, I generalised findings/concerns to protect the anonymity of individual responses. The findings from the interviewees, including points not covered in the literature are in section 5.

## 5. Findings

Of the sampled group from the Heads of Audit group, seven companies responded and agreed to undertake the interviews. Between these respondents they have been involved in 37 ERP projects both working on and auditing through the projects. These are from the financial, manufacturing, utilities and food industries.

Note: Each respondent made it clear that the answers are their opinions based on their experiences and not that of their companies. A consideration here relates to the requirement to respect confidentiality around the answers obtained from the selected informants. Accordingly, answers are grouped with those of the other participants and cannot be attributable back to individuals.

The areas addressed were: Critical Success factors, Problems areas encountered, Preventative actions to address problems, Internal Audit's contribution/role in ERP and Internal Audit skillsets required. The following are the results from the interviews.

### 5.1 Critical Success Factors

Using the identified critical success factors from the literature review, each respondent was requested to rank their top 10 CSFs based on their own experience and to add any other areas that they consider to be critical. See Table 2.

	Critical Success Factors	Chosen by
1	Clear goals and objectives	All
2	Change management	6
2	Top management support	6
2	Project team competence	6
2	Project management expertise	6
6	Sufficient time for detailed planning	5
6	Use of steering committee – empowered decision makers	5
8	Management of expectations	4
8	Open communication	4
8	Careful package selection / structured procurement	4
11	Minimal customization	3
11	Education on new business processes/User training	3
11	Project champion	3
11	Business Process Reengineering	3
11	Vendor support / Use / Partnership with vendor/consultants	3
11	Interdepartmental cooperation	3
17	User Involvement	2
17	Data analysis & conversion	2
19	Dedicated local resources	1

*Table 2 Interviewees top 10 CSFs.*

In addition, they consider the following, which were not detailed in the top10 CSFs from the literature review, as critical to the success of an ERP implementation:

- Value measurement mechanism to quantify the cost of implementation, maintenance and depreciation versus benefit accrued
- A robust dependency identification and management process
- Risk and issue management process / continuous project risk assessment
- Quality assurance by a semi-independent function reporting directly to steering committee
- Succession planning and reporting for long-term ERP projects to address movement / loss of experienced project team members
- Clear project methodology – with templates, processes, protocols etc.
- Robust well designed testing with appropriate test scripts and documentation.

There were some differences in views held by the interviewees, as there were between the TOP10 CSFs from the literature review, but this is not surprising and accords with Ngai et al.(2008) who found that '*there is no general agreement on which set of factors are key to success in ERP implementations*'.

## 5.2 Where problems impact upon projects

Having identified problems encountered from the literature review, respondents were asked, based on their own experience, to indicate at what stage they consider the problems to have an impact and to identify any other problems that they deem to be critical. See Table 3.

Phases	Initiation	Planning	Executing	Monitoring/ Controlling	Close
Examples of problems:	Number of responses per stage				
Poor top management commitment and support	7	7	7	5	4
Poor project management effectiveness	5	6	6	5	3
Ineffective project cost and time management	2	6	6	5	3
Poor quality of Business Process Reengineering (BPR)	4	6	6	3	2
Unclear concept of the nature and use of ERP system from the users' perspective	3	4	5	6	3
ERP system mismatch between ERP and Organisation	4	6	3	4	4
Too tight project schedule	3	5	6	4	3
Lack of metrics for evaluating project progress	2	5	4	4	4
Poor consultant effectiveness	4	5	5	3	2
Users' resistance to change	1	3	5	4	4
Ineffective knowledge transfer / communication	3	4	3	2	4
High turnover rate of project team members	1	4	7	3	1
Poor IT infrastructure	1	2	5	5	2
Unrealistic expectations from top management concerning the ERP System	3	4	3	2	3
Inadequate training of end-users	1	1	5	3	4
Poor quality of testing		1	5	4	4
Over-reliance on heavy customization		2	5	4	2
Negative effect of Corporate culture	2	2	3	2	2

Table 3: Interviewees problem impact areas.

Additional areas they considered could significantly impact upon an ERP implementation were:

- Use of the wrong implementation approach/methodology. Is the organisational and cultural fit ok for the project context e.g. Agile vs. Waterfall, Phased vs. 'Big bang'?
- Poor management of implementer/vendor
- Many projects accept the contract template provided by externals rather than forcing their own terms and conditions onto the contractors
- Failure to allocate expertise in the area of contract management i.e. measuring deliverables against what is stipulated in contracts. Most projects track actuals but few track predictions/estimates to completion using recognised calculation processes and tools



- Lack of Quality Assurance during the life of the project
- Scope-creep: poor change control over solution design and implementation
  - System design not adequately quality assured
  - System design documentation not fit for purpose
- Focus on cost as opposed to best-fit
- Data conversion problems particularly relating to master data
- Project board roles and responsibilities not fully understood by board members
- Poor change management procedures
- Reporting requirements for users.

### 5.3 Preventative actions

Interviewees were asked what they consider the most important preventative actions that if taken in time, should deal with potential problem areas within an ERP implementation. They were given 12 examples based on the literature review and asked to rank them 1-12 with 1 as most important. They were encouraged to identify any other actions that they consider should be undertaken. See Table 4:

Rank	Sample Preventative actions:
1	Detailed planning involving appropriate business and IT resources
2	Appropriate knowledge available across the team
3	Effective partnership with external expert consultants
4	Agreement on level of customisation of proposed solution
5	External consultants challenge the local business and IT assumptions about the project
6	Allocation of experienced local resources to the project (business, IT)
7	Use of independent resources to review progress of the project against the defined stages/milestones
8	Top management support visible to all
9	Appropriately qualified resources allocated to create and then deliver/review each 'user-impacting' area i.e. training, testing
10	Frequent communication across the entire project team and users at every stage of the project
11	'Critical path' advised to team members
12	Appropriate contingency time built into the schedule

*Table 4 Interviewees preventative actions*

Their other identified preventative actions were:

- Do not underestimate the quality and level of business resources required
- The identification of Legacy systems upgrades, patching, change freezes, reporting due dates i.e. year- end / month-end and how these may effect implementation and the resources available for the project
- Robust change management process around reporting, implementation, structure for authorisation, testing, sign-off
- Escalation/resolution mechanisms
- Continuous risk assessment, if surpass previously defined thresholds, activate appropriate action plans
- Agreed testing methodologies and test phases, with adequate test and defect management tools.

## 5.4 Internal Audit role in ERP implementations

The interviewees were asked, other than as an independent reviewer, what they consider Internal Audit's role to be. The responses were:

- Review control design of deliverables to ensure there are robust controls designed into the system
- Assess the controls in place and that they are operating effectively
- Advise on specific areas of control e.g. Financial auditors advise on large Capital Expenditure projects
- Review that projects are run in accordance with best practice, e.g. steering meetings are happening, costs monitored and reported
- Influence - directing people to best practice
- Help to build confidence and ultimately help facilitate project success through advising on effective program risk management
  - Identify risks associated with the project around governance and deliverables
- When people know Internal Audit will review and report, they may pay more attention to getting it right
- Provide an external viewpoint, not aligned to project hierarchy
- Opportunity to participate in the closure & lessons learned process
- Challenger
  - independent assurance delivery on time/budget and plan and confirm project status/progress.
  - Gives program management another opinion, challenge 3<sup>rd</sup> party vendors
- While additional roles are possible from an operational auditing perspective, extreme care must be taken to ensure Internal Audit does not become part of the project plan.

#### 5.4.1 At what stage should Internal Audit become involved?

See Table 5.

Stage	Agreed by:
Initiation	All
Planning – Business process redesign	All
Executing	6
Monitoring and controlling	All
Closing	4
Post implementation Review	6

Table 5 Interviewees view on which stages IA should be involved.

Comments were:

- During Planning, Internal Audit would sit in on Project Management meetings and check on such things as the team dynamics to observe if there is any friction; also checks on the ability of the team to provide solutions.
- Execution – Internal Audit review the go/no go decision(s) and sense check them, check that project is heading in the right direction and advise management
- Has a Monitoring role not Controlling.

#### 5.4.2 Are there other areas that Internal Audit should be involved in?

The responses were as follows:

- Internal Audit should be involved all the way through
- The process for how projects are approved and scoped
- Change control processes for changes to scope, deliverables, timelines, costs, benefits etc.
- Project being aligned to the company strategy
- Influencing / reviewing the development and use of Project Management best practice, processes and methodologies
- For some projects, audit have been involved at initiation phase, other times at planning and execution phases but mostly at monitoring/controlling phase. The respondent considers post-implementation reviews as a separate endeavour, and

ideally Internal Audit should be involved before this phase, as implementing recommendations at this phase can be very costly

- If Quality Assurance (QA) is being done independently, review these QA's as they occur
- In getting involved in the various stages, the Auditor needs to be self-aware and ensure they remain independent and don't compromise their professional judgement.

### 5.4.3 Benefits of Internal Audit involvement

Interviewees were given some examples and asked what they consider to be the **main** benefits of having Internal Audit involvement in an ERP project. They were encouraged to identify any other benefits. See Table 6.

Examples:	Responses
Independent review of project progress	All agree
Raise issues/concerns not being addressed within the project	All agree
Risk management expertise	5 agree
Direct line to audit committee/company senior management	4 agree
Company knowledge	3 agree
Sharing best practice/insights from other areas	5 agree

*Table 6 Interviewees view on benefits of IA involvement*

Other benefits identified were:

- Provides assurance either positive or negative on the project governance processes, the project being aligned to the company strategy and that what has been approved to be implemented is still on course to be implemented
- In a well-controlled/controlling organisation, knowing that Internal Audit will be reviewing and reporting to Board Audit Committee can carry a significant amount of weight with business management, project team and contractors / implementation partners
- Review business process mapping to ensure objectives have been realised and no glaring gaps
- Keep third parties 'honest' as someone else is monitoring what they are doing

- For “Company knowledge”, in some cases, deep technical knowledge of a platform can add more than company or business knowledge can, as this can identify poor/low quality technical implementation or systems development work in advance of go-live.

#### 5.4.4 Risks for Internal Audit working in ERP projects

Interviewees were given some examples and asked what they consider to be the main risks for Internal Audit being involved in an ERP project. They were then encouraged to identify any other risks. See Table 7.

Examples:	Responses
Independence issues	6 agree 1 NA
Too control focussed	4 agree 2 disagree 1 NA
Not business aware	4 agree 2 disagree 1NA
Management abrogating responsibility for monitoring progress to Internal Audit	6 agree 1 NA

*Table 7 example risks for Internal Audit*

Other comments were:

- Internal Audit don't keep their independence and get involved in signing off or making design changes to what they think the project should do
- If Internal Audit works “in” the project as opposed to reviewing it, then it naturally follows that Internal Audit is at risk of getting too intimate with the project and in turn needing another independent set of eyes. Internal Audit should only review and not be involved with the design
- Perhaps a risk of over-confidence on the part of an auditor that they know more than the project team
- Quality of reporting – does the auditor convey the messages in the right way

- Every auditor and audit process can be different. Results depend on the auditor(s), their skills, experience, expertise, scope of their review, availability of deep technical skills
- Reviews take a lot of resources and time from the audit team resulting in a risk to the other areas that need to be covered as part of the audit plan
- All are **potential** risks if Internal Audit's role is not clearly defined at the outset of the project.

#### 5.4.5 Risk mitigation

Interviewees were asked what could be done to mitigate the above risks. They replied:

- Define Internal Audit's roles/responsibilities and communicate these to all impacted stakeholders e.g. the project teams and senior management
- Review only. Any consulting on an ERP project must be strictly controlled and authorised by the Audit Committee, and not just the Head of Internal Audit
- Don't sign off on project documentation
- Obtain additional advice on the role of Internal Audit in reviewing ERPs. Training for Internal Auditors in auditing projects and to gain experience on a project delivery
- Have the right people available for the job and then getting access to do the job properly. Some of the risks may derive from auditor(s) not being self-aware enough, although a good auditor will be self-aware and will adjust their scope and approach to suit
- Clear scope showing what has and hasn't been done.

## 5.5 Internal Audit Skillsets required

Interviewees were given some examples and asked what skillsets they consider should be available to Internal Audit when undertaking a review of ERP projects. See Table 8.

Examples:	Agreed by
Business knowledge	All
IT expertise/knowledge	All
Familiarity with project management methodologies	All
Architectural knowledge	6
Platform knowledge	All

*Table 8 Internal Audit Skillsets*

Other skillsets identified were:

- Auditors need to be appropriately trained and experienced in project management and not just familiar, otherwise the risk is that key issues may not be raised
- Where an organisation has many different architectures, it is difficult for an auditor to be as skilled as the business and IT professionals working on the implementation. This is always a challenge and comes back to self-awareness on the part of the auditor. If in planning an audit, an auditor identifies a risk area that needs to be reviewed but for which they are not qualified to review, they should seek to get approval to co-source the needed resources or alternatively, scope it out and note the scoping change in the audit report
- Internal Audit needs to have knowledge of how business processes are mapped to specific ERP platforms
- Auditors need an IT background with appropriate audit qualification e.g. CISA<sup>3</sup> (Certified Information Systems Auditor)
- For reviews of the application/ERP itself, architectural and platform knowledge is necessary
- Soft-skills such as communications and negotiation
- Data Migration experience
- Familiarity with business transition management.

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<sup>3</sup> Certified Information Systems Auditor (CISA) is a globally recognized certification in the field of audit, control and security of information systems



### 5.5. 1 What skillsets would you employ if not already within your team?

- Use proven external specialists/experts as required for:
  - Project management
  - IT architecture experience
  - Technology specialists
  - Security & control experts
  - Specific platform skills
  - Application functional knowledge
  - Treasury
  - Data Analytics.
- Sourcing and procurement to review contracts with the vendor/partner
- Business expertise (bring in someone from another business in your Group/Company that can assist IA in reviewing a business domain)
- Business process mapping.

## **6. Analysis, recommendations and conclusion**

My research question is to investigate how Internal Audit can contribute to the success of ERP implementation projects in an Irish context. The feed-back from the interviewees regarding the list of CSFs was that this was very detailed and indeed 'thought provoking' and that none of the points mentioned could be ranked 'no impact'. Each commented that it was difficult to rank the CSFs as it would depend on the project being implemented and also on the company project experience level i.e. if they had implemented other similar projects in the past and had developed their structures and processes taking cognisance of learnings from those earlier projects.

### **6.1 Analysis**

The rankings for their top10 (Table 2) accord in general with the rankings shown in Table 1 above. Although the project champion was only chosen by 3 of 7 respondents(ranked 11), the others all had this as important but not critical. The use of steering committee/empowered decision makers along with defined clear goals and objectives combined with top management support and an experienced and competent project team are the underlying success factors that the respondents consider to be the most critical. Independent Quality Assurance is an area that all considered should be in place with Internal Audit having a role as a reviewer of this function, and not having Internal Audit as the quality assurance function itself. This is to ensure the independence of the Internal Audit unit is not compromised.

The interviewees confirmed that Internal Audit have been involved at various stages of ERP projects in reviewing progress to date and reported back to senior management, or their designates. In accordance with the audit framework, the auditors first established what the objectives of each stage were, identified risks to achieving those objectives, ascertained the controls in place to mitigate those risks and then tested the control effectiveness. They

expanded on the problems outlined in Table 3 with those that they encountered as part of their reviews.

The dependence on external consultants is mentioned in a number of articles and this was also considered as being a critical review point for Internal Audit. Until companies can build up their experience in implementing ERP solutions, they are dependent on the external advisors/consultants/system integrators to plan and in some cases, manage the project. Concern was expressed relating to the use of the consultants' contracts rather than 'in-house' company specific contracts. As part of a project governance review, Internal Audit reviews such contracts. Indeed Internal Audit worked with management, in a number of cases, in reviewing contracts submitted by external parties to ensure that appropriate controls are included to accord with the company's control environment. Recommendations made by Internal Audit resulted in a formal process being adopted where external consultants are more closely 'vetted' and contract/service level agreements must reflect the company requirements. In addition, external consultants/experts are being used to challenge the company perspectives on benefits that an ERP system could deliver. Accordingly management will insist on these external vendors having had similar experience before and then adopt a partnership approach to the project where detailed roles and responsibilities are defined, agreed and communicated to all impacted stakeholders.

As Ryan (1999) found that Project Managers need additional skillsets to implement ERP projects, it is clear from the interviewees that Internal Audit will need to progress in the same direction. This is reflected in the evolution of the role of Internal Audit as defined in COBIT5 framework. The consensus from the interviewees was that each audit team should have a mix of business and IT resources. For ERP projects the emphasis is on having appropriate IT skills and a professional qualification e.g. CISA, is a requirement in most Internal Audit units. In addition to IT, program management experience is now also a requirement, or at least having studied the subject and worked with experienced auditors who have such knowledge. Each of the interviewees stated that if they don't have the skills in-house then

they will source and employ the required skills externally to achieve the audit objectives. The auditor will 'partner' with these people and is expected to learn from them so that they can refine their audit work programs and keep 'up-to-date' with 'best practice'.

The benefits of using Internal Audit have been acknowledged by management in each of the interviewees' companies. This took some effort from Internal Audit to get to that position and to gain management's confidence that they can provide a viable service to assist in the success of the business-critical and strategically important ERP projects. In some cases initially, Internal Audit were asked to review an ERP system as part of a post implementation review. This exercise outlined areas that could have been done better as part of the overall project management process. From this start, management have now progressed to inviting Internal Audit to review projects as they are in progress as part of their governance structure. However, Internal Audit maintains their independence and continues to report along their defined structure rather than into the project hierarchy.

As outlined in the literature, Jani (2008), a project manager's self-efficacy can have a negative impact if, for example, the project is failing but the PM may continue to believe that they are in control and can 'turn it around'. Internal Audit provides assurance either positive or negative on the project governance structure and practices and also has an objective view of progress against defined deliverables. By being independent, this removes the 'emotion' from the process. In addition, a number of interviewees said that once the project teams know that Internal Audit are involved, then they are more inclined to adhere to their company's existing project management practices. They added that they (Internal Audit) have built up strong professional relationships with project management and are seen as providing assistance to the project. Internal Audit has a greater view of issues arising throughout a company, and can advise ERP project management on similar issues that have arisen and also on the solutions that have been successfully implemented.

ERP failures can have a seriously negative impact upon a company in the areas of cost, time, business process and customer impact. Accordingly, by using the skillsets and

experience available within an Internal Audit function, particularly in the areas of risk management, corporate governance and control reviews, management will be informed in a timely manner as serious issues arise and can then develop plans and actions to address such problems. Early diagnosis and appropriate actions will contribute to the success of a project. As part of the audit framework, Internal Audit always follow up on all issues raised so this will assist in addressing some of the problems identified in the literature, Markus et al. (2000), relating to problems 'flowing' from stage to stage within a project but not being addressed.

## **6.2 Conclusion:**

In companies where Internal Audit has been involved, there has been an improvement in identifying, in a timely manner, issues that could negatively impact upon the business. This has been experienced particularly in the ongoing management of external consultants and also in the change in attitude among project managers who now see Internal Audit as a resource that can be used and indeed, in many cases, Internal Audit reviews are included in project plans. The recognised 'up-skilling' of Internal Audit units has also assisted in increasing their profile amongst the project teams within the sampled companies.

## **6.3 Recommendation:**

Internal Audit should be used to assist corporate management as an independent review and monitoring function to confirm that the defined and agreed methodologies, objectives and deliverables are being realised as part of ERP implementations. Internal Audit should participate at each stage of the project and not just after the project has concluded.

## 7. Limitations / Directions for Future Research

The main limitation is in the number of interviews that I was able to undertake among the Heads of Audit and their designated representatives. As this is a limited sample, the results are applicable to that group. Accordingly I will not make statistical generalisations about Internal Audit's role 'world-wide' outside of these particular companies based in Ireland.

As I concentrated on how Internal Audit as a unit can assist in the ERP process, I did not look at how ERP projects themselves are structured and the skills in place within them. My focus was on the role of an Internal Audit function within a company implementing an ERP environment. As the aim was to establish what the role should be and also if Internal Audit was supported by company management, the interview process did not include project managers who had no audit experience.

Future research could investigate if findings here are applicable to projects undertaken outside of Ireland. It will also be interesting to note if the views expressed by Internal Auditors are shared by project managers who do not have an audit background. A further research topic could be around what project managers themselves consider is the value, if any, of having Internal Audit involved.

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## Appendix A - Research Ethics Approval

Dear John,

Many thanks for your research ethics application which was reviewed by the KBS Research Ethics Committee on the 14<sup>th</sup> May. I am pleased to inform you, that your application has been given research ethics approval.

Kind regards.

Michelle

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