

Closer to the cloud - The impact of cloud technology on the role of management accountants –

a research note

Gerhard Kristandl, University of Greenwich, UK

g.kristandl@greenwich.ac.uk

Martin Quinn, Dublin City University, Ireland

martin.quinn@dcu.ie

Erik Strauss, WHU Otto-Beisheim School of Management, Germany

erik.strauss@whu.edu

1. Introduction

The role of the management accountant - has been the subject of many studies, especially in the area of accounting and organizational change. Some studies have found role changes which are perceived as positive to the management accountants (Goretzki et al, 2013, Burns and Vaivio, 2001; Weber, 2011), while others note potentially less favourable changes (Otley, 2008; Scapens and Jazayeri, 2003; Wagle, 1998). In particular, role changes suggesting a move towards a business partner/ business advisor type role have been noted by many academics (e.g. Goretzki et al., 2013; Weber, 2011; Baldvinsdottir et al., 2009; Byrne and Pierce, 2007; Järvenpää, 2007; Burns and Vaivio, 2001; Granlund and Lukka, 1998) as well as practitioners (Simons, 2012; Boettger, 2012). In such work, several theories such as institutional theory (Burns and Baldvinsdottir, 2005; Goretzki et al., 2013), legitimacy theory (Goretzki et al., 2013), sociometric theory (Wagner et al., 2011), contingency theory (Byrne and Pierce, 2007), (strong) structuration theory (Coad and Herbert, 2009; Jack and Kholeif, 2008) and actor-network theory (Dechow and Mouritsen, 2005) have been suggested and used as lenses to interpret observed changes (or stability).

Since the emergence of accounting one major driving factor of the changing role of accountants and managements accountants has always been has been the exponential development in information technology (e.g. Abbott, 1988, chapter 8; Scapens et al., 2003). Especially since the late 1990s, fully-integrated ERP systems were said to be responsible for freeing the accountant of the previous bean-counting and routine work, and move their focus towards consulting or advising

line managers (e.g. Goretzki et al., 2013; Weber, 2011; Scapens and Jazayeri, 2003). However, only recently have we started to see the actual impact of ERP systems on the work of management accountants (e.g. Wagner et al., 2011; Chen et al., 2012; O'Mahony and Doran, 2008; El Sayed, 2006; Dechow and Mouritsen, 2005; Caglio, 2003).

Where a majority of these studies find mainly positive impacts with ERP systems in place, other authors (Otley, 2008; O'Mahony and Doran, 2008; Scapens and Jazayeri, 2003; Davis and Albright, 2000; Wagle, 1998) have found that there might be less need for accountants, as the ERP is able to assume managerial reporting needs for decision-making. That indicates that information technology might not only free management accountants but potentially also render them unnecessary.

Now, in the early 2010s, businesses face a different kind of technology landscape, with a potentially similar impact to that of ERPs twenty years ago. Today, new information technology trends such as mobile devices, real time data processing, or cloud technology represent developments that have the potential to revolutionize the economic interaction. Particularly, cloud technology has been enabled by high-speed internet, and processing power hitherto unknown has been made available to businesses. In particular, the switch to not necessarily having to install software on a personal computing device is something novel. For example, standard software packages like Microsoft Office, ERP like SAP or accounting software like Sage are now available in the cloud. With cloud technology, which we detail later, users can access information at any place and any time, using a variety of different devices. For management accountants, this may have advantages, but also results in some challenges.

In this research note, we hope to start a discussion on how management accountants may proactively embrace the challenges of this new stream of technology. We compare previous waves of research on the effect of new technology developments on the role of the management accountant, focusing on ERPs. We then link this body of research to some recent empirical findings from an exploratory survey of Irish small and medium businesses. A key finding from this research is that a large majority of respondents in management accounting roles confirmed that information technology now permits managers to bypass the management accountant when seeking information. Based on the lessons learned from previous research around ERPs, we suggest possible solutions to potential threats from cloud technology, thus maintaining the legitimacy of management accountants' roles.

2. Background and motivation for this study

This paper was motivated by preliminary findings from a cross-industrial survey undertaken in 2012. We asked management accounting staff in 87 public and private Irish organisations about their use of information technology (including cloud technology) in the collection, management and preparation of decision-relevant information. Our survey was exploratory, with the aim of extracting relevant and current aspects for further research in the area of management accounting and technology. The survey revealed an interesting fact that motivated this paper. We found that in 88% of those organizations that switched to an internet-based information service (cloud-based), managers are bypassing management accountants when accessing and consulting decision-

relevant information.¹

Given that most accounting and business software can collect, process and report decision-relevant information, we wondered whether there was a risk that management accountants might lose their advisory role as well as their historic core task of providing decision-relevant information. In other words, is the legitimacy of management accountants threatened by a new breed of technological advance? We likened this notion to similar considerations in the past whenever new technological developments could absorb tasks and responsibilities from management accountants. Similar to Granlund and Malmi (2002) and Chapman and Chua (2003) when considering the impact of ERPs on accounting, we propose there is a need for research into the impact of cloud technology on the role of management accountants. In particular, as the developments in cloud technology are moving at an accelerated pace, there is a risk that management accounting research is left behind when this technology is already stabilising (CDW, 2013; Gartner, 2012) and becoming a market force to be reckoned with. The long-term implications of cloud technology are yet unknown, as companies lack experience over a longer time period like during the time of the ERP diffusion (Granlund and Malmi, 2002). However, we may learn from experiences with ERPs, and apply the knowledge gained to new technologies such as cloud computing.

To our knowledge, there are no studies that examine the impact of cloud technology on the role of management accountants. Thus, a potential contribution of this paper is to add the aspect of cloud technology to previous research on the impact of information technology on management accountants. We may also add to existing research by proposing a new perspective on the “hybrid accountant” (Caglio, 2003). We further propose additions to the education of future accountants, adding a more in-depth information technology expertise to the role of the management accountant that goes beyond knowledge of management accounting tools and techniques (e.g. Simons, 2008).

In this research note, we are not looking to identify drivers of management accounting change (Shields, 1995), nor are we looking at the processes of change (Scapens and Jazayeri, 2003; Burns and Scapens, 2000). This paper’s aims are threefold. First, we explore whether cloud technology is similar to the impact of ERP systems on management accountants, with a distinction that cloud technology can be extended to small and medium businesses. Second, we investigate whether the management accountant might face similar risks with cloud technology as reported when ERP systems entered the corporate world. Third, we explore potential additions to the “hybrid” accountant that performs non-accounting tasks (Caglio, 2003) in order to mitigate or even eliminate the perceived risk of a management accountant becoming obsolete in crucial parts of his/her role.

3. From counting beans to advising managers

As noted previously, the role of the management accountant is subject to on-going change. Many academics have discarded the view that “bean-counting” is still a major portion of what management accountants actually do in organisations (e.g. Baldvinsdottir et al., 2009; Burns and Baldvinsdottir, 2005; Burns and Scapens, 2000; Reay et al., 2006; Otley, 2008; Järvenpää, 2009; Burns and Vaivio, 2001; Weber, 2011; Goretzki et al., 2013). The paradigm of a role that purely provides decision-relevant information by operating along an information-processing value chain

¹ 77% are knowingly bypassed, 11% assumedly, and a further 11% of management accountants responded they are not bypassed.

(information identification – recording — analysis – reporting) does not reveal the full story. This however, is still the dominant view in many current management accounting textbooks.

One of the main streams in management accounting change literature is a first emerging (e.g. Scapens and Jazayeri, 2003; Burns and Vaivio, 2001; Granlund and Lukka, 1998) and later ongoing (e.g. Byrne and Pierce, 2007; De Loo, 2010; Weber, 2011; Goretzki et al., 2013) trend towards a business partner role, where management accountants do not spend a majority of their time gathering and preparing decision-relevant information for managers. In fact, the development from a role that processes and prepares largely operative, day-to-day decision-relevant data, to that of an integrated business representative with a wider and more influential strategic focus has been moving “the focus of activity from the factory floor to the boardroom table” (Otley, 2008, p. 232). This new role has been termed “business partner” (Goretzki et al., 2013; Weber, 2011; Järvenpää, 2007; Byrne and Pierce, 2007), “internal business consultant” (Burns and Vaivio, 2001), “extreme accountants” (Baldvinsdottir et al., 2009), “business advisor” (De Loo et al., 2010), “controller accountant” (Granlund and Lukka, 1998) or “hybrid accountant” with a business orientation (Caglio, 2003; De Loo et al., 2010; Burns and Baldvinsdottir, 2005; Byrne and Pierce, 2007). This is coherent with Otley’s (2008) observation that “traditional management accounting is diminishing” (p.235), as management accountants seem to encounter the need to turn towards taking up additional roles, tasks and responsibilities (Weber, 2011) in order to fulfil and legitimize this embedded role. As noted by Burns and Baldvinsdottir (2005) moving the accountants closer to what happens in the business, to integrate them so they can proactively support management, lifts the management accountant into a highly prominent and influential role where they can add value (O’Mahony and Doran, 2008). Of course, this requires an altogether new set of skills and responsibilities that need to be developed (Weber, 2011), first and foremost going beyond the numbers, working cross-functional and lead as well as participate in a variety of teams and projects (O’Mahony and Doran, 2008). In contrast, Byrne and Pierce (2008) in a series of interviews with 36 financial and operating managers in medium and large Irish manufacturing firms found that the decision partnering aspect was not as prominent as in other studies, being more of a “recommender” or “suggestor” than a decision maker (p.482).

However, this shift towards a deeper embedding in the business is not just an academic discussion. Considering the rhetoric of professional bodies such as the Chartered Institute of Management Accountants (CIMA), the role of the management accountant has also evolved from a mere provider of cost information to an ‘in-house consultant’ and business partner in all things operational and strategic (Simons, 2012; Bhimani and Bromwich, 2010). In these areas, the management accountant’s skills “are able to add little value” (Otley, 2008, p. 235), and the role is also contested by other specialist functions like operational management or information systems.

4. The role of information technology and Enterprise Resource Planning systems

The perceived higher integration of management accountants in business has not been due to a lower amount of “beans” to count, or a lower degree of information requirements in a business. The need for “crunching the numbers” is still prevalent and did not just disappear; however, this has rather been taken over by information technology that can perform these often repetitive and non-value adding tasks for the management accountant (O’Mahony and Doran, 2008), mainly collecting, measuring, analysing and reporting decision-relevant information (Burns and Vaivio, 2001). As such, technology has been identified as a major driver for management accounting

change (e.g. Goretzki et al. 2013; O'Mahony and Doran, 2008). It can thus be argued that a major driving factor of the change to the role of management accountants stems from the exponential developments in information technology (Scapens et al., 2003). As early as 1987, Johnson and Kaplan (1987) ignited a debate on the potential future development of management accounting (and hence management accountants), during which they already acknowledged a rising influence of technology on management accounting. Notably, they predicted a higher accuracy and timeliness in reporting and control systems by means of local area networks (LAN) - almost 30 years ago. The exponential rise of higher processing power, emerging technologies such as affordable internet broadband, electronic data interchange or enterprise resource planning (ERP) systems have enabled management information systems to assume more and more routine management accounting tasks (Goretzki and Weber, 2012; Scapens and Jazayeri, 2003; Caglio, 2003; Burns and Vaivio, 2001) and allowed management accountants to dedicate their time to more value-adding uses. In a study by O'Mahony and Doran (2008), a business analyst they interviewed estimated that they have previously spent 50% of their time crunching the numbers, but due to ERP systems, this has halved. The rise of increasingly powerful technology has encompassed all levels and all functions of an organisation (Burns et al., 1999; Scapens et al., 2003). As a drawback, the management accountant gets cut out as the owner of the information provision process, as managers are able to easily access relevant real-time information from the PCs on their office desks (Scapens et al., 2003), reducing the time for each reporting cycle (Byrne and Pierce, 2007).

Information technology as a factor that impacts the role of the management accountant has thus been clearly identified in previous research. As stated above, one of the main forces within relevant technology were ERP systems. We propose that by investigating the lessons learned from various studies of ERP systems and their impact on the management accountant, we may be able to draw some first conclusions for the emerging cloud technology in business. At this point, however, we need to make a clear distinction between the perceived impact of information technology on management accounting methods and management control systems on one hand, and on the other hand the role of the management accountant that includes tasks and responsibilities of that role. So far, we have clearly focused on the latter, especially since extant literature does not seem to find much evidence that existing management accounting routines have been greatly impacted by ERP systems in particular. Scapens and Jazayeri (2003) as well as Granlund and Malmi (2002) state that these systems may provide a stabilising role for the aforementioned management accounting tasks. In an interview with an accounting Software-as-a-Service (SaaS) provider in 2011, we found this fact confirmed - if anything, the existing methods were merely exported onto technologically different (and often more powerful) platforms. Results of a survey among 439 CIMA-affiliated organisations actually show that both 'traditional' (pre-1980s) and 'new' management accounting techniques are in use throughout organisations, but the use of some other 'new' techniques is less widespread. The CIMA (2009) study concludes that traditional accounting tools are on average preferred to the more complex and 'new', or as the authors of the study note "the more traditional tools of variance analysis and overhead allocation remain the most popular" (2009, p.11). Although the authors of this CIMA (2009) study did not particularly investigate information technology, it makes it unlikely that management accounting systems *per se* are subject to much change. Very often, new, more sophisticated systems merely replace old systems in a very similar fashion (Scapens and Jazayeri, 2003). O'Mahony and Doran (2008) also found only a limited impact on the practices of management accountants (similar Jack and Kholeif, 2008).

5. Enterprise Resource Planning Systems

To set some context for later discussion, we now briefly explore some literature on ERP software. Historically, ERP systems could be viewed as an evolutionary development of MRP (materials requirement planning) systems that enabled automation of the “bills of material” for products in a manufacturing environment. This gave rise to packaged software offered to organisations throughout the 1970s and 1980s (Dugdale et al, 2006). These were, from today’s point of view, merely automated costing systems that helped spread “best practice” approaches to various organisations worldwide. However, unlike the later ERPs, MRPs did not integrate corporate-wide key business processes across several modules like sales, finance, logistics, human resources or accounting into a single system. O’Leary (2000, pp. 61-67) summarises the essential features of ERP as follows:

ERP is a packaged software solution for use in a client-server environment – this means the software is delivered as is, and is intended to be installed in a centralised (server) location as well as on a client PC that is connected to the server. The technology integrates the majority of business processes, meaning that as many processes as possible are incorporated into the software, leaving fewer processes to be performed by other software. Moreover, ERP process the vast majority of business transactions and the system contains a single enterprise-wide database. Data access is real time, available throughout the organisation at any time and transaction processing can be integrated to planning and scheduling activities, meaning for example that customer orders could feed directly to a production schedule. Additionally, ERPs support multiple currencies, languages and organisational structures. Finally, industry-specific solutions are often provided.

Although these software packages can be customised to specific client needs (Granlund and, 2002), it is more often the organisation that adapts to the ERP. As suggested earlier, ERP has put some pressure on the traditional role of management accountants. It could be argued that the management accountant formerly owned the information process, mainly because the information technology function was encompassed within the accounting role. With systems such as ERP that integrate all business processes across various modules, the ability to produce and use information has been decentralised and disseminated across the organisation (Otley, 2008), enabling non-accounting functions to access the same information and produce the same reports in real time (Scapens et al., 2003). The management accountant turned from primary controller (El Sayed, 2006) to consumer of accounting information.

This notion that non-management accounting functions can assume what the management accountant previously used to legitimise his/her role may threaten the business advisor role, as the traditional skills of management accountants have been assumed to an extent by non-accounting roles (Otley, 2008; O’Mahony and Doran, 2008; El Sayed, 2006; Caglio, 2003). If this leads to less and less management accountants actually being employed (Chapman and Chua, 2003; Davis and Albright, 2000), the future market for management accounting skills might be under attack as it is relatively straightforward to transfer management accounting knowledge to line managers, information system staff or engineers, using ERPs (O’Mahony and Doran, 2008) and given the right training. Friedman and Lyne (1997) early on suggested three possible scenarios if information systems facilitated management accounting tasks: 1) a move from bean counter to business-oriented accountant (as previously discussed); 2) no change, as new techniques are merely a passing trend; 3) a transfer of management accounting skills to engineers, leaving - if at all - a

management accounting hull. Consequently, there is a certain risk that the management accountant does not develop towards a business advisor or partner, but gets marginalised by enabling technologies such as ERP and cloud technology. Competition by other non-accounting roles might not just affect the information gathering and provision skills, but also the consulting and advisory skills (Burns and Vaivio, 2001) that are at the core of a business partnership role. A closer look at what cloud technology entails is warranted before we return to the risk identified in our survey, and attempt to draw parallels to the discussion around ERP, including suggested solutions to the problem.

6. Cloud computing

As noted earlier, the evolution in technology has changed society at all levels, accounting included. Information technologies and systems in particular have advanced dramatically since the 1970s, particularly for organisations to the point that they are no longer the confine of the finance or accounting function; rather they have evolved to encompass all levels and all functions of an organisation (Burns et al., 1999; Scapens et al., 2003). With ERP as a major development in IT, some management accounting techniques and controls have become embedded within software (Burns and Quinn, 2011).

These same information technology advances have also changed how business is done. Bhimani and Bromwich (2010) capture the essence of business change in the past decade or so very eloquently:

The 'fluid' organisation is a 21st century phenomenon. In less than a decade, the forces of globalisation, digitisation, technological advance and novel information exchange possibilities have altered the nature of organisational structuring and flows (2010, p. 53).

In particular, the increase in bandwidth has enabled an exponential increase in data exchange. An evolution of internet technologies has been heavily supported by ever increasing bandwidth that was unthinkable in the days of the dial-up modem. In 2013, organisations as members of society operate on ultra-broadband networks that run on glass-fibre (Evens et al., 2013). By 2013, it is possible to stay online all the time, and access the internet from anywhere, downloading, uploading and streaming content at a speed that seemed unthinkable a decade ago. High bandwidth network connections are considered as an important factor in economic growth (Evens et al., 2013; Bell and Walker 2011).

Facilitated by increasing bandwidth, "Web 2.0" has had an enormous impact on how businesses have adapted or emerged as the internet itself has developed. This may include companies that solely do business on the internet, or businesses that have adapted to the challenges presented by the internet. O'Reilly (2007, p. 37) summarises the main features of Web 2.0 businesses as follows:

- Services, not packaged software, with cost-effective scalability;
- Control over unique, hard-to-recreate data sources that get richer as more people use them;
- Trusting users as co-developers;
- Harnessing collective intelligence;
- Leveraging the long tail through customer self-service;

- Software above the level of a single device;
- Lightweight user interfaces, development models, and business models.

O'Reilly describes the above competencies as a “gravitational core” rather than a set of “hard boundaries” (2007, p.18). Some well-known businesses readily match some of the above competencies. For example, Amazon is known to leverage the long tail of less well-known books to increase profitability²; Apple Inc.’s iTunes crosses multiple devices. However, Web 2.0 *per se* is not a business model template - defining the internet as a participatory and user-defined web does not necessarily clarify how companies operate; this is where the term ‘cloud computing’ (or ‘cloud technology’ or simply ‘the cloud’) comes in. Cloud computing is a more specific business model detailing how a company delivers a service. It depicts the internet as a computing platform. It shares many of the characteristics that O'Reilly (2007) defined for Web 2.0, such as on-demand self-service, scalability or elasticity (Böhm et al., 2010; Mell and Grance, 2011). On the other hand, cloud computing is not about user participation (such as open source projects, social media, or wikis see Brodtkin, 2008). Whereas Web 2.0 is a summative term for the current concepts of how the internet works, evolves and exists, cloud computing is a specific delivery and business model.

In a cloud computing business model, the main ‘product’ sold is a service (Knorr and Gruman, 2008; Mell and Grance, 2011); this ranges from software as a service (SaaS), to platform as a service (PaaS) up to a fully functional infrastructure as a service (IaaS). Essentially, the cloud has enabled former products to be traded as services over the internet. This removes the need to download, to install, or to maintain software on a physical server. The delivery as a service is more likened to the delivery of a utility instead of a product (Böhm et al., 2010; Mell and Grance, 2011). There are some well-known examples of Web 2.0 type business models - for example O'Reilly (2007) mentions firms such as Google, eBay, Mapquest, Amazon, PayPal and Flickr.

7. Cloud technology and ERPs - a lot in common

The anytime-anywhere access to information on all kinds of devices, either portable (smartphones, tablets, phablets, laptops) or not portable (desktop PCs), independent from the operating system (Android, iOS, Windows 8), consumable as a service (SaaS) for a subscription fee, and enabled by anytime-anywhere access has become commonplace by now. For companies, it can be seen as an enabling technology (Simons, 2011) and a change in a contextual factor for management accountants. Particularly, accessing accounting data by portable devices is increasing as portable devices are the artificial symbol of the anytime-anywhere access. These devices allow their users to answer their questions everywhere around the world, in any situation such as performance meetings or sales talks. Apart from a network connection, another important requirement for this kind of information access is the “information architecture”, i.e. how the information is displayed. Most mobile devices have relatively small screens compared to standard desktop screens. Accordingly, the amount of information that can be displayed at once is limited – more limited than at desktop screens. As a consequence, information will be displayed less detailed or with connection between different kinds of information cannot be displayed. Overall, the information architecture has to be less complex.

² See Anderson (2009) for more illustrations of this phenomenon.

Therefore, managers using mobile devices for accessing accounting data tend to base their decision on less complex information architecture. On the one hand, this has a positive effect as managers directly use accounting data for decision-making which could lead to a more frequent use of accounting data. On the other hand, this can also have the negative effect as some information and complexity has been eliminated by the reduced screen-size which means, simultaneously, that managers base their decisions on less comprehensive information.

However, cloud technology is not a replacement of ERP systems (or any other software), quite the opposite. In fact, there are IT providers such as SAP, Oracle or Microsoft that host ERP systems in the cloud, thus demonstrating that ERP and cloud technology work as complements rather than one replacing the other. However, for the purposes of this research note, the introduction of ERP systems might have had (and still has) a comparable effect on management accountants that enables us to put our exploratory research in perspective. That cloud technology is currently reshaping the IT landscape is undisputed by practitioners (CDW, 2013; Gartner, 2012). Even more importantly, cloud technology has already entered a phase where overly enthusiastic expectations have mellowed, according to Gartner's Hype Cycle for Cloud Computing Report 2012. Cloud computing is currently seen in a phase Gartner calls the "Trough of Disillusionment" where technologies receive a reality check necessary in order to achieve eventual profitability from this development (Gartner, 2012). Cloud computing and other terms in the realm of cloud technology like "Big Data" are seen by Gartner as 2-5 years from mainstream adoption - in other words, considered more than just a "passing trend". The future potential of cloud technology is demonstrated in current market projections. For instance, the market for business cloud computing is projected to grow up to 53% in Germany in 2013 (Bitkom, 2013), and Gartner forecasts that more than 50% of companies worldwide will have developed some form of strategy for SaaS-based application use (Gartner, 2012). Interestingly, among the factors that drive the latter, Gartner (2012) identifies a high priority on customer relationships, gaining better insights through analytics, moving costs from capital expenditure to operating expenditure, and aligning their IT more efficiently to strategic goals. Moving to the cloud is more and more a business decision instead of a "pure" IT one (CDW, 2013).³

As two technologies with high impact on organisations, there is common ground between the introduction and implementation of cloud technology and ERP to potentially warrant a "lessons learned from ERP-related research" approach. For example both technological developments may affect the management accountant because there is a perceived high impact on information provision and data handling in organisations. In addition, the new technology allows access to corporate information at any time or place throughout the organisation, (accounting) data is held in a central repository and can be accessed in real time and reports can be generated in real time. As a consequence, management accountants potentially lose ownership of information provision process and non-accounting roles perform traditional management accounting tasks.

³ As a side note, the participants of surveys similar to the ones by the Gartner Group or CDW are usually information technology professionals, CIOs, or CTOs, so roles directly involved in the implementation and running of these technologies. The (management) accountant does not seem to be explicitly singled out as an "advisor" when it comes to these – as the CDW (2013) study reveals – strategic business decision. The CDW 2013 state of the cloud report mentions that non-IT managers are involved in the cloud decision, but (management) accountants are neither named nor identified. This is disconcerting, as there seems to be at least no indication that management accountants were indeed involved in these business decisions.

The last two arguments in particular suggest that the management accounting lessons learned from ERP can be extended and expanded to cloud technology. In fact, the dispersion of information within the organisation and the management accountant's loss of ownership of the information provision process has even been furthered (or exacerbated, depending on the point of view) by cloud technology; it renders decision-relevant accounting information readily available, anytime, anywhere, directly accessible via desktop computers, laptops, smartphones and tablets – for ERP, there was still the need for a software application to be installed on a PC. Anyone in an organisation can access data and information with just a browser and an adequate internet bandwidth. This discussion even extends now to those businesses that were hitherto unable to afford costly IT such as ERP. Large investments in an IT infrastructure are no longer required, with SaaS enabling small businesses to access and use once costly IT systems.⁴ Software delivered using cloud technology requires just an internet browser; maintenance is done automatically and without the customer even noticing. If additional modules (such as accounts, payment systems, billing, etc.) are required, the customer merely extends the subscription, so scalability and flexibility are considerably increased as opposed to the standard client-server architecture and the rigidity of ERP that are delivered that way.

8. Deja vu - Cloud risk for the management accountant and the pro-active hybrid accountant

Clearly, the discussion that was led about the risk to the role of the management accountant due to technology advances may trigger a “deja vu” in practising management accountants. The risks identified from ERP are likely to be found in a similar vein coming from cloud technology. Our preliminary findings in Ireland (see above) suggest that not only might the manager attempt to bypass the management accountant, but also the management accountant may no longer know the requirements (information, structure, content) the manager has. As discussed above for ERP literature, managers are able to gain direct knowledge of their costs, budgets and other information that is relevant to their decisions (Scapens and Jazayeri, 2003), and create their own reports in any format they require in order to make decisions (Granlund and Malmi, 2002). Line managers and other non-accounting functions seem to be able to handle accounting information themselves (Otley, 2008; Scapens and Jazayeri, 2003) as it moves out of the accounting function. This might detach management accountants not only from their core responsibilities, but also from the newer business partnership-role if they do not keep abreast of internal business processes. Accounting literacy is not necessarily exclusive to management accountants, as discussed above (El Sayed, 2006).

The answer to a perceived loss of control by the management accountant might be in a “pro-active role hybridisation”. Again, this notion comes from lessons learned and previous research when looking at ERP. It has been suggested that management accountants need to develop expertise in areas that were not part of their standard skill-set before, such as strategic decision-making, management and information technology (Caglio, 2003). This extension of skills gave rise to the term “hybrid accountant” when the impact of ERP was discussed in previous research. Where Burns and Scapens (2000) relate the hybridisation of the management accountant role to early database systems of the 1990s, they do not refer to ERP in particular. However, database systems, as a means to access, analyse, decentralise and disseminate information could be equated to ERP,

⁴ ERPs are typically the preserve of larger organisations (O’Leary, 2000).

and consequently, based on and extended to cloud technology. Thus, based on evidence in Burns and Scapens (2000), the effect of information systems on management accounting was seen prior to ERPs *per se*.

Caglio (2003) also suggests that accountants are becoming “hybrids”, but in the aftermath of ERP specifically. Accounting skills are transferable to both line managers (Scapens and Jazayeri, 2003) and information systems staff (Caglio, 2003). As many of the traditional functions of (management) accountants are performed by the ERP, more time is available for accountants to devote to “business planning ... [and] ... the design and management of IT systems” (Caglio, 2003, p. 124), which would go far beyond using standard software such as Microsoft Excel or Access (Azan and Bollecker, 2011). Caglio also suggests that skill transfer can flow in both directions, with information systems professionals also gaining accounting knowledge (2003, p. 124). Caglio’s (2003) work found three areas of change affecting accountants following ERP implementation, namely: (1) a standardisation of accounting activities; (2) a need for integration and collaboration across business functions; and, (3) a prominent role of the accountant in the management and configuration of the ERP. The latter point supports the notion of hybridisation of accountants (see also Burns and Baldvinsdottir, 2005). Newman and Westrup describe ERPs as having the potential to allow what they term “lights off financial processing (LOFP)” (2005, p. 258) which, in other words, means removing the skills of management accountants in financial reporting. They develop the concept of the technology power loop (Scarborough and Corbett, 1992) to depict how management accountants can either adapt and increase skills or lose power and position to other organisational members (e.g. the IT function) (2005, p. 261). Newman and Westrup also found that the emergence of hybrid management accountants preserved the expertise of management accountants within organisations and retained their influence in the technology power loop (2005, p. 268).

For the management accounting profession, there is a need for greater involvement in business processes, requiring a considerable enlargement of their roles (Byrne and Pierce, 2007), especially towards information technology. With ERP introduced, implemented and running, a range of authors has clearly pointed towards the management accountant taking ownership of the process of implementation, configuration, maintenance, operation and system evaluation of ERP (Burns and Vaivio, 2001; Granlund and Malmi, 2002; Byrne and Pierce, 2007; Azan and Bollecker, 2011; Goretzki and Weber, 2011; Chen et al., 2012). This clearly suggests how essential in-depth IT expertise and skills for the management accountant has become. The textbook knowledge that we teach our accounting students has not acknowledged this as what organisational reality experiences.

9. Implications and future research

This paper followed three aims. Our first aim was to establish that cloud technology and ERP systems are indeed similar with regards to technological impact on management accountants but different with regards to their influence on the information architecture. The similarities identified earlier suggest that cloud technology is a similar technological driver of change as ERP was (and still is) (Scapens et al., 2003), and as such warrants to base potential implications from our findings on previous suggestions that came from ERP-related literature in the field of management accounting change.

Our second aim was to determine whether the management accountant might face similar risks with cloud technology as reported when ERP systems entered the corporate world. Motivated by our own findings, we propose that if the implications of anytime-anywhere access to decision-relevant information by means of cloud computing technology are not actively incorporated into the role of management accountants, this may put a dampening effect on their influence on decision-making processes in general, and the suggested role of a “business partner” in particular. We ultimately suggest that management accountants might lose a certain amount of influence and relevance in an organisation adopting cloud technology unless they actively acquire the corresponding knowledge, in other words, a “pro-active hybridisation” of their own role.

This leads directly to our third aim, where we explore possible additions to the picture of the “hybrid” accountant (Caglio, 2003) in order to mitigate or even eliminate the perceived risk of a management accountant becoming obsolete in crucial parts of his/her role. Management accountants need to be a leading instead of a lagging factor of the set-up and maintenance of information systems that leverage the processing power and data sets embodied in cloud technology - even if managers bypass their role in order to access it. That means that the management accountant with IT expertise would be the ideal role to implement and operate the cloud-based information system so that managers are not only supplied with information, but supplied in a way that ensures that it is properly used (Weber, 2011). To do this, management accountants will need to develop a set of in-depth information technology skills to the point that they have expertise in creating the information system itself. Of course, for the systems in the cloud to provide decision-useful information to managers, management accountants would not only require their “standard” technical finance and accounting skills, but given that the cloud is part of the business strategy (CDW, 2013), they also need strategic thinking as well as an overall business orientation, thus turning into business productivity-enhancers (O’Mahony and Doran, 2008).

By taking ownership of the underlying cloud strategy, the management accountant might turn the initial risk of getting bypassed into an opportunity to strengthen the legitimacy of their own role by proactively moving into a cross-functional, “hybrid” set of skills. In addition, management accountants could actively train and advise non-accounting personnel (including managers, similar Chen et al., 2012, for ERPs), and as such fill a corporate teaching position and guide others towards correct use and interpretation of accounting information. By eclipsing the full information generation and provision process, the management accountant would be able establish himself as the primary information hub that keeps on advising management and teaching others how to use accounting information. In other words, we suggest a “grey eminence” positioning by pro-actively taking on a hybrid position within the organisation (Caglio, 2003).

These suggested changes lead us back to Otley (2008) who says that the label “management accounting” is no longer valid. Our picture of the management accountant as “grey eminence” or a “reservoir of knowledge” (Byrne and Pierce, 2007), that has controllership of various functions leads to the conclusion that the term “management accountant” might indeed not capture what this role might entail in the future - unless we attempt to redefine these terms and give it new meaning. CIMA, for instance, promotes a change of the “management accountant” concept (Simons, 2011) by adding tasks and responsibilities to the role. In fact, this might open various paths to legitimising the role, not only from the management accountant’s side. Caglio (2003) has posed a similar question for ERP systems back then: “Are accountants likely to broaden their roles and expertise in the field of business and IT? Or, instead, is it line people and IS professionals who are going to

expand their activities and competencies in the traditional preserve of accountants?" (p.124). According to Caglio (2003), a "cross-hybridisation' between the accounting positions and practices and the positions and practices of the IT people and of line staff has become almost inevitable – this is in accordance to our suggestion here.

The suggestions above are mainly targeted towards management accountants that are already trained and in the organisation. However, there is another implication for future management accountants and accounting training. If we require management accountants to demonstrate competencies that dig deep into the body of knowledge of other fields - such as information technology - then accounting education programmes by professional bodies and universities need to take this into account (Azan and Bollecker, 2011; Byrne and Pierce, 2007). It could be postulated that future management accountants need to be educated towards their role as hybrid accountants, as "jack of all trades", to understand the direction the business is taking (strategically and operationally), be at the epicentre of the IT landscape (Azan and Bollecker, 2011, Burns and Vaivio, 2001), advise other roles in the organisation how to deal with accounting data. University programmes thus will need to incorporate elements of strategy, operational thinking, business processes, information and computer technology, programming as well as pedagogy next to accounting.

In this research note, we hope to start a discussion on how management accountants may embrace the challenges of cloud technology, and avoid being bypassed by managers that seek and use information by means of cloud computing which ultimately might also harm a move towards a business advisory role. Ultimately, without the active input by and involvement of management accountants and thus the active implementation of management accounting knowledge in technology, the systems might not be monitored and used in a decision-useful manner. Based on the lessons learned from previous research around ERPs, we suggest a proactive hybridisation of management accountants in order to maintain the legitimacy of their role.

Future research might look at the actual skills that management accountants needed to develop and apply after the implementation of cloud technology (competencies, skills, knowledge, etc.), whether previous experience and knowledge from e.g. ERP implementations, knowledge of running systems in and from the cloud, how managers use these systems (e.g. is bypassing the management accountant a regular occurrence). Since this research note did not particularly look at theoretical approaches and frameworks, this might be also a field for future research.

References:

Azan, W., Bollecker, M. (2011), "Management control competencies and ERP: an empirical analysis in France", *Journal in Modelling in Management*, Vol.6, No.2, pp.178-199.

Baldvinsdottir, G., Burns, J., Norreklit, H., Scapens, R.W. (2009), "The image of accountants: from bean counters to extreme accountants", *Accounting, Auditing & Accountability Journal*, Vol.22, No.6, pp.858-882.

Bell, S., Walker, S. (2011), "Futurescaping Infinite Bandwidth, Zero Latency", *Futures*, Vol. 43, pp.525-539.

Bhimani, A., Bromwich, M. (2010), "Management accounting – retrospect and prospect", Elsevier, London.

Bitkom (2013), "Cloud Computing wächst zweistellig", Bitkom, [online]. Available at: <http://www.bitkom.org/de/themen/61492_67073.aspx> [Accessed April 29, 2013]

Böhm, M., Koleva, G., Leimeister, S., Riedl, C., Krcmar, H. (2010), "Towards a Generic Value Network of Cloud Computing", Proceedings of the 7th International Workshop on Economics of Grids Clouds Systems and Services (GECON) - LNCS 6296, edited by Altmann, J. and Rana, O. F., pp. 129-140, Springer, Heidelberg.

Boettger, U. (2012), "Business Partnering im Controlling bei der BASF", Controlling & Management, Vol.56, No.1, pp.30-36.

Brodkin, J. (2008), "Open source fuels growth of cloud computing, software-as-a-service", NetworkWorld, [online]. Available at: <<http://www.networkworld.com/news/2008/072808-open-source-cloud-computing.html>> [Accessed May 1, 2013]

Burns, J., Baldvinsdottir, G. (2005), "An institutional perspective of accountants' new roles - the interplay of contradictions and praxis", European Accounting Review, Vol.14, No.4, pp.725-757.

Burns, J. & Quinn, M. (2011), "The routinisation of management controls in software", Journal of Management & Control, vol. 22, no. 5, pp. 5-24.

Burns, J. & Scapens, R. (2000), "The Changing Nature of Management Accountants and the Emergence of 'Hybrid' Accountants", IFAC, New York.

Burns, J., Vaivio, J. (2001), "Management accounting change", Management Accounting Research, Vol. 12, No. 4, pp. 389-402.

Burns, J., Ezzamel, M., Scapens, R. (1999), "Management accounting change in the UK", Management Accounting, Vol. 77, No. 3, pp. 28-30.

Byrne, S., Pierce, B. (2007), "Towards a More Comprehensive Understanding of the Roles of Management Accountants", European Accounting Review, Vol.16, No.3, pp.469-498.

Caglio, A. (2003), "Enterprise Resource Planning Systems and Accountants: Towards Hybridization?", European Accounting Review, Vol.12, No.1, pp.123-153.

CDW (2013), "Surprises and silver linings: 2013 State of the cloud report", CDW, [online]. Available at: <<http://www.cdwnewsroom.com/2013-state-of-the-cloud-report>> [Accessed May 1, 2013]

Chapman, C., Chua, W. (2003), "Technology-driven integration, automation, and standardization of business processes, implications for accounting", in Bhimani, A. (Ed.), *Management Accounting in the Digital Economy*, Oxford University Press, Oxford, pp. 74-94.

Chen, H.J., Huang, S.Y., Chiu, A.A., Pai, F.C. (2012), "The ERP system impact on the role of accountants", *Industrial Management & Data*, Vol.112, No.1, pp.83-101

CIMA, (2009), "Management Accounting survey – 2009 results", [online]. Available at: <<http://www.cimaglobal.com/en-gb/Thought-leadership/Research-topics/Management-accounting-in-different-sectors/Management-accounting-survey>> [Accessed May 1, 2013]

Coad, A., Herbert, I.P. (2009), "Back to the future: new potential for structuration theory in management accounting research?", *Management Accounting Research*, Vol.20, No.3, pp.177-192.

Davis, S., Albright, T. (2000), "The changing organisational structure and individual responsibilities of managerial accountants: a case study", *Journal of Managerial Issues*, Vol. 12 No. 4, pp. 446-468.

De Loo, I., Versteegen, B., Swagerman, D. (2010), "Understanding the role of management accountants", *European Business Reviews*, Vol.23, No.3, pp.282-313.

Dechow, N., Granlund, M., Mouritsen, J. (2006), "Management Control of the Complex Organisation: Relationships between Management Accounting and Information Technology", In: Chapman, C.S., Hopwood, A.G., Shields, M.D. (eds), "Handbook of Management Accounting Research", Elsevier, Amsterdam, pp.625-640.

Dechow, N., Granlund, M., Mouritsen, J. (2007), "Interactions between information technology and management control" in *Issues in Management Accounting*, eds. T. Hopper, D. Northcott & R. Scapens, London.

Dechow, N., Mouritsen, J. (2005), "Enterprise resource planning systems, management control and the quest for integration", *Accounting, Organizations and Society*, Vol.30, No.7-8, pp.691-733.

Dugdale, D., Jones, T.C., Green, S. (2006), "Contemporary Management Accounting Practices in UK Manufacturing", CIMA Publishing, Oxford.

El Sayed, H. (2006), "ERPs and accountants' expertise: the construction of relevance", *Journal of Enterprise Information Management*, Vol.19, No.1, pp.83-96.

Evens, T., Seys, C., Boudry, E., De Vlieger, L., Verdegem, P, De Marez, L. (2013), "'It's the services, stupid!': Identifying killer applications for next-generation networks", *Telematics and Informatics*, Vol.30, pp.121-131.

Friedman, A. L., Lyne, S. R. (1997), "Activity-based techniques and the death of the beancounter", *European Accounting Review*, Vol.6, No.1, pp. 19–44.

Gartner (2012), "Hype Cycle Report 2012", [online].
Available at: < <http://www.gartner.com/id=2102116>> [Accessed April 28, 2013]

Goretzki, L., Strauss, E., Weber, J. (2013), "An institutional perspective on the changes in management accountants' professional role", *Management Accounting Research*, Vol.24, pp.41-63.

Goretzki, L., Weber, J. (2012), "Die Zukunft des Business Partners – Ergebnisse einer empirischen Studie zur Zukunft des Controllings", *Controlling & Management*, Vol.56, No.1, pp.22-28.

Granlund, M., Lukka, K. (1998), "Towards increasing business orientation: Finnish management accountants in a changing cultural context", *Management Accounting Research*, Vol.9, No.2, pp.185-211.

Granlund, M., Malmi, T. (2002), "Moderate impact of ERPS on management accounting: a lag or permanent outcome?", *Management Accounting Research*, Vol. 14, pp. 299-321.

Jack, L., Kholeif, A. (2008), "Enterprise resource planning and a contest to limit the role of management accountants: a strong structuration perspective", *Accounting Forum*, Vol.32, No.1, pp.30-45.

Järvenpää, M. (2007), "Making business partners: a case study on how management accounting culture was changed", *European Accounting Review*, Vol.16, No.1, pp.99-142.

Järvenpää, M. (2009), "The institutional pillars of management accounting function", *Journal of Accounting and Organizational Change*, Vol.5, No.4, pp.444-471.

Johnson, H.T., Kaplan, R.S. (1987), "Relevance lost – the Rise and Fall of Management Accounting", Harvard Business School Press, Boston.

Knorr, E., Gruman, G. (2008), "What cloud computing really means", *InfoWorld*, [online].
Available at: <<http://www.infoworld.com/d/cloud-computing/what-cloud-computing-really-means-031?page=0,0>> [Accessed April 29, 2013]

Mell, P., Grance, T. (2011), "The NIST Definition of Cloud Computing: Recommendations of the National Institute of Standards and Technology", [online] National Institute of Standards and Technology.
Available at:<<http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf>>
[Accessed April 28, 2013]

Newman, M., Westrup, C. (2005), "Making ERP's work: accountants and the introduction of ERP systems", *European Journal of Information Systems*, Vol. 14, pp. 252-272.

O'Leary, D. (2000), "Enterprise Resource Planning Systems – Systems, Life Cycle, Electronic Commerce and Risk", Cambridge University Press, Cambridge (USA).

O'Mahony, A., Doran, J. (2008), "The Changing Role of Management Accountants; Evidence From the Implementation of ERP Systems in Large Organisations", *International Journal of Business and Management*, Vol.3, No.8, pp.109-115.

O'Reilly, T. (2007), "What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software", *Communications and Strategies*, Vol. 65, pp. 17-37.

Otley, D. (2008), "Did Kaplan and Johnson get it right?", *Accounting, Auditing and Accountability Journal*, Vol. 21, No.2, pp.229-239.

Reay, T., Golden-Biddle, K., Germann, K. (2006), "Legitimizing a new role: small wins and microprocesses of change", *Academy of Management Journal*, Vol.49, No.5, pp.977-998.

Scapens, R.W., Jazayeri, M. (2003), "ERP Systems and Management Accounting Change: Opportunities or Impacts? A Research Note", *European Accounting Review*, Vol.12, No.1, pp.201-233.

Scapens, R.W., Ezzamel, M., Burns, J., Baldvinsdottir, G. (2003), *The Future Direction of UK Management Accounting*, CIMA Publishing, London.

Scapens, R., Turley, S., Burns, J., Joseph, N., Lewis, L. and Southworth, A. (1996), "External Reporting and Management Decisions: A Study of their Interrelationship in UK Companies", CIMA Publishing, London.

Scarborough, H., Corbett, M. (1992), "Technology and Organisation: Power Meaning and Design", Routledge, London.

Shields, M. D. (1995), "An empirical analysis of firms' implementation experiences with activity-based costing", *Journal of Management Accounting Research*, Vol.7, pp.148-166.

Simons, P. (2012), "Management accountants must learn to speak in the language of the business to be better business partners", *Controlling & Management*, Vol.56, No.1, pp.39-43.

Sorensen, J.E. (2009), "Management accountants in the United States: practitioner and academic views of recent developments", In Chapman, C.S., Hopwood, A.G., Shields, M.D. (eds), "Handbook of Management Accounting Research", Elsevier, Amsterdam, pp.1271-1296.

Wagle, D. (1998), "The case for ERP systems", *McKinsey Quarterly*, Vol. 2, pp. 131-138.

Wagner, E.L., Moll, J., Newell, S. (2011), "Accounting logistics, reconfiguration of ERP systems and the emergence of new accounting practices: A sociomaterial perspective", *Management Accounting Research*, Vol.22, pp.181-197.

Weber, J. (2011), "The development of controller tasks: explaining the nature of controllership and its changes", *Journal of Management Control*, Vol. 22, Iss.1, pp.25–46.

Yi, M., Tayles, M. (2009), "On the emergence of strategic management accounting: an institutional perspective", *Accounting and Business Research*, Vol.39, No.5, pp.473-495.