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Top IT Issues for Employers of South African Graduates

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Abstract. Technology trends and challenges in industry today are pressurising higher education institutions to rethink their curricula design, particularly for IT programmes. The World IT Project was designed to examine important issues confronting IT employers in many parts of the world. The purpose of this paper is to critically analyse the findings of a survey of South African IT employees, particularly related to the top technical and organisational IT issues faced by IT management and other IT staff. The results obtained were compared to those previously reported in earlier years, and to those of other countries that participated in the World IT Project. We found that the top technical and organisational issues in South Africa are not necessarily those receiving the most hype; rather, bread-and-butter issues such as reliable, efficient IT infrastructure or enterprise application integration are key concerns: issues often receiving insufficient attention in our academic curricula. Another important finding with educational policy implications is that the IT skills shortage is of much higher priority in South Africa than in the developed world; this highlights the need for additional resources in IT education.

Keywords: IT issues · SA employers · IT curricula · IT skills shortage

1 Introduction and Research Questions

Recent technology trends in industry continue to affect the competitiveness of organisations globally. Graduates with the necessary skills and competencies

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capable of addressing these challenges will be highly sought-after [39]. Technological innovation continues to improve productivity in organisations; however, this could also lead to displacement of unskilled workers and graduates without the required competencies. Indeed, technology changes raise the concerns about the likely increase in technological unemployment and segmentation of the labour market. Studies have long shown that education plays an important role in technology developments and that educated and skilled graduates have a relative advantage in the use and implementation of new technology [3].

When considering the relationship between technology, skills and employment [39], the design of Information Technology (IT) programmes at universities becomes more critical. In India for instance, the IT industry employs close to 10 million workers, contributing to 67% of the market (US$ 124–130 $\cdot 10^9$), with an expected growth of 12–14% over 2017 and beyond [13]. In this regard Indian universities continue to explore ways to revise technology and engineering curricula in order to meet the changing needs of industry and society [32]. India is part of the 'BRICS' group of emerging nations which also includes South Africa. The majority of studies relating to technology and employment issues were conducted in more technology advanced countries and may thus be biased in their views. South Africa, as a developing country, may not face the same challenges as those regions, and research relating to contexts such as the ones found in Africa is thus needed.

This paper describes some aspects of a larger research project, the 'World IT Project'. It curbs the bias in Information Systems (IS) research towards American or Western views by means of a global study and a survey of the perceptions of IT staff in organisations [31]. The information captured pertained to organisational, technological and individual IT issues, and related these to cultural and organisational factors. This paper investigates a subsection of these issues and analyses the top technology and organisational IT issues faced by South African organisations. The research questions answered by this paper are:

- *What are the top technological and organisational IT issues reported by small, medium and large South African organisations?*
- *How do these issues differ from those reported in the international literature?*

2 Related Work

2.1 IT Graduate Employment: Supply and Demand Perspectives

Supply. There is consensus in South Africa that the lack of needed IT skills is one of the main issues many IT graduate employers face. Studies are now suggesting an increased imbalance between the supply side (effective graduates) and the demand side (IT graduate employers) for South African IT employment needs, with supply not adequately meeting demands [29]. The demand for skilled IT graduates in South Africa is continually mounting [7]. Though the number of IT graduates appears to be growing, IT employers are still constantly faced with the task of recruiting skilled graduates into their organisations [23]. Lotriet

(et al.) have proposed a 'rethink' of how both universities and IT employers could cooperate towards solving the IT skills shortage that South Africa faces. The imbalance between supply and demand for IT graduates has motivated academics and educators to suggest new *curricula* [12], new *teaching styles* and techniques [35], as well as new *topics* [38] to close the gap between commercial needs and graduates' capabilities.

From a supply perspective, the Centre for Higher Education Transformation's findings on South Africa's education landscape suggest that the country has been experiencing high skill attrition rates coupled with insufficient capacity for adequate skill production [8]. Popescu highlighted the role of the South African government in the dynamics of structuring, regulating and financing the supply-side of higher education institutions [34].

Higher education continues to experience phenomenal changes that can be considered 'revolutionary' [2], wherein technology continues to play a big role. In the context of the 'information age', information has become a significant foundation for globalisation; its production is growing daily. Technology in education has been regarded as playing an important role in the information age [6]. Technological advances have paved the way for the restructuring of education and business models. Universities are under pressure to constantly revise approaches to education and curricula design for educating IT graduates with proper capabilities for the information age.[1] Modern education systems are therefore being redesigned with technology in mind. It is generally agreed that educating IT graduates is a challenge for higher education institutions. The notorious 'expectation gap' between industry needs and academic preparation has made the institutions the targets of severe criticism [1,33]. An important issue emerging in higher education is how to restructure programmes for 'continuous education' [33]. Due to the ever-changing skills needed in IT [9], part-time programmes should be designed that focus on continuous 'upskilling' of IT professionals.

Because of the role IT plays in education, studies have shown that higher education in South Africa (and other African countries) is technologically more marginalised than outside of the continent [40]. In this regard, African universities face problems of generating, accessing and disseminating information. This makes it even more difficult for them to respond to business challenges [34].

Demand. As a result of the changing educational landscape, many businesses now seek IT graduates who are conversant with emergent technological changes that can assist businesses' readiness in the '4th industrial age'. From a demand side and from the IT graduate employers' perspective, having an understanding of the critical IT issues is considered crucial in enabling these businesses to function more effectively [31]. This understanding can assist with effective IT graduate recruitment and the development of competitive IT policies and strategies. IT employers are prioritising to become pro-active w.r.t. attracting,

[1] Several papers on this topic can be found in the SACLA'2018 post-proceedings: see *this volume* of CCIS.

developing and retaining valuable talent, since this has a large impact on an organisation's success [16].

Employers now require qualified IT specialists with high expertise in networking, computing, and programming, and who are able to design, develop, and deploy pervasive computing systems and communication architectures for business sustainability [21]. These business requirements have motivated changes in the IT curriculum [22]. For example, *accounting* firms recommend that 'Big Data', information technology, and IS be integrated into accounting coursework to enable graduates to work in data-centric environments [36].

2.2 Issues Faced by IT Staff and Management (1994–2004)

Since 1980, surveys have been conducted annually with the aim of identifying the key IT issues faced by management. The Society for Information Management (SIM) spear-headed this research by outlining American issues with the hope of aiding IT executives globally. The first SIM study surveyed American organisations and identified key areas of technological investment reported by those organisations [4]. A comparative analysis of the top 10 issues faced by IT staff and management during 1994 and 2002 can be found in [15].

2.3 Issues Faced by IT Staff and Management (2005–2017)

Next we review the literature on issues faced by IT staff and management from 2005 to 2017. Our review includes organisational IT issues as well as specific technological and application issues in various countries.

Organisational IT Issues. A survey of 31 CIOs in South African organisations in 2006 revealed that the top five organisational IT issues were security and control, building a responsive IT infrastructure, IT value management, service delivery, and improving IS strategic planning [15]. In 2009, the SIM project extended the survey to include not only U.S.-American organisations but also several European and Chinese ones [24]. The issues are summarised in Table 1.

The top 10 IT management issues have remained relatively constant over time as management considerations evolve slowly under normal circumstances [24]. The 2016 SIM study [18] reported that the top 10 organisational IT issues were IT-business alignment, security and privacy, innovation, agility and flexibility (of IT), agility and flexibility (of business), cost reduction controls (business), cost reduction controls (IT), speed of IT delivery and time to market, strategic planning, as well as productivity and efficiency. Two issues that were in the top four for importance to organisations and to IT leaders in the two most recent SIM studies of 2015 [17] and 2016 [18] were IT and business alignment as well as security and privacy. These are briefly discussed below.

Table 1. Top 10 Org.-issues (top-down) for IT staff and management (2004–2016)

2004: USA [26]	2006: SA [15]	2009: USA, China, EU [24]	2014: USA, China, EU [17]	2016: USA, China, EU [18]
IT and business alignment	Security and control	Business productivity, cost reduction	IT and business alignment	IT and business alignment
Attracting, developing, retaining IT professionals	Building a responsive IT infrastructure	IT and business alignment	Security and privacy	Security and privacy
Security and privacy	IT value management	Business agility, speed to market	Business agility and flexibility	Innovation
IT strategic planning	Service delivery	Business process re-engineering	Business productivity	Agility and flexibility (IT)
Speed and agility	Improving IT strategic planning	IT cost reduction	IT time-to-market, speed of delivery	Agility and flexibility (business)
Government regulations	Disaster recovery	IT reliability and efficiency	IT value proposition in the business	Cost reduction controls (business)
Complexity reduction	Aligning IS organisation within the enterprise	IT strategic planning	Velocity of change in the business	Cost reduction controls (IT)
Measuring performance of IT organisation	Using IS for competitive advantage	Revenue-generating IT innovations	Innovation	Speed of IT delivery, time-to-market
Creating an information architecture	Effective use of data resources	Security and privacy	Business cost reduction, controls	Strategic planning (business)
IT governance	Developing and implementing an information architecture	CIO leadership role	Revenue-generating IT projects	Productivity, efficiency

Alignment of IT and Business. Alignment of IT and business is a persistent issue and elusive goal for IT management. Its importance is confirmed by its constant presence in the top 10 management issues since it first appeared in 1984 [10,17]. According to [11,37], while IT business alignment has improved globally, there is a strong correlation between the maturity of the alignment and an

organisation's performance. One reason as to why it remains a consistent issue is due to ever-changing organisations, markets, economics, and technologies, which require alignment to be a continuous activity [17].

Security and Privacy. Organisations are prioritising on security and privacy issues due to the increase in high profile cybersecurity breaches [17]. Security and privacy have been a constant concern for management, remaining in the top 10 list since 2003 [25]. In 2015 there was a global shift in the importance of security and privacy, moving to 2nd position from previous years when it placed around 6th–9th [17]. This increase in importance was due to the large number of security breaches reported at Adobe, Community Health Systems, Experian, Facebook, Home Depot, Neiman Marcus, PF Chang, Target, Twitter, the U.S. Department of Homeland Security, the U.S. Federal Reserve Bank, etc.

Other Issues for the Organisation, IT Management and IT Employees reported as important are business agility and productivity. For an organisation to be relevant in today's competitive economy, business agility is essential for business growth [10]. Since 2009, business agility has ranked in the top three positions of management issues, moving to the 3rd place in 2015. This ongoing high rank suggests that the greater uncertainty and increasing pace of change that characterise the current times correspondingly increase the need for organisations to be more flexible and responsive to market, economic, regulatory, legal, and other changes [17]. IT Time-to-Market is an enabler of agility, productivity and the IT value proposition [20].

Since its introduction into the SIM IT Trends in 2007, business productivity has remained in the top 10 list of issues, which shows that organisations are still trying to 'do more with less'. The importance of business productivity varies, moving from the 7th place in 2008 to the 1st in 2009 on the list of management issues globally [10,25].

IT reliability and efficiency is an issue that has grown in importance due to the growing complexities of IT systems and ever-increasing reliance of business operations on IT [28]. This issue refers to the accuracy, timeliness and accessibility of the data and information delivered by IT [24]. In 2008, when it was introduced into the SIM survey, it ranked 8th. Its importance increased from 2009 to 2010 where it ranked 6th and 4th respectively. However, 2010 was its final year as a combined organisational concern; thereafter it was separated into two categories: IT reliability and IT efficiency.

Technological Issues. The SIM survey also reports on the top IT (i.e. technology) issues as perceived by the staff. These are listed in Table 2. The SIM survey of 2004 [26] identified the top six application and technology development issues as: security technologies, business intelligence (BI), business process management (BPM), Web Services, customer portals, and data synchronisation. Half of these technologies were new to the list of top developments.

The top five important technology investments reported by the most recent SIM study of 2016 [18] are analytics/BI/Big Data, application software development, (cyber)security, cloud computing, and customer relationship management (CRM). BI has remained as one of the top three major IT investments since 2003 [10]. BI refers to a diverse set of technologies and applications for gathering, storing, analysing and providing access to data to identify valuable trends [5]. Credit card companies, for example, use BI systems to compare each new charge with previous transactions to identify possible fraud. As BI has remained a high ranking IT investment across various countries, it seems that IT leaders know that their organisations are 'rich in data but poor in insight' [25].

Cloud computing and mobile applications first appeared in the SIM surveys in 2009 and were identified as priority technologies [10]. Cloud computing was ranked as the 17th most important technology whilst mobile and wireless applications came 24th. The following year cloud computing jumped to the 5th most important technology and has remained within the top five ever since. Mobile personal devices and tablets are increasingly supported by IT as a replacement for office desktop or laptop computers [25]. Subsequent years have shown the increasing importance of mobile/wireless applications: in 2010 they ranked 9th, and in 2011 4th. However, from 2012 their position has fallen to 13th in 2014.

CRM systems aim to facilitate interactions between customers and clients by automating, organising and synchronising business processes related to sales, marketing and customer service [25]. By using CRM systems, companies can enhance quality and efficiency, decrease overall costs and promote enterprise agility. In 2009, CRM systems first appeared in the SIM surveys at rank 13, moving up to the 9th place in 2010 and to the 5th place in 2011. During times of economic recession, European and Asian companies invested more into CRM systems in order to focus on improving customer trust and intimacy [28].

Enterprise resource planning (ERP) systems have remained in the top five largest technology investments from 2009 until 2014 [10]. However, in the most recent SIM survey they dropped to the 6th place [17]. Using ERP systems is an effective method to enable IT to help businesses to reduce costs and improve productivity [30]. ERP systems can provide the foundation for a wide range of e-commerce-based processes including web-based ordering and order tracing, inventory management, and built-to-order goods.

Business process management (BPM) has been a persistent issue in the SIM surveys since 2004 [28]. Since its introduction it varied between 3rd and 18th place [27,28]. BPM is a discipline that can significantly contribute to meeting an organisation's objectives by means of improvement, ongoing performance management, and governance of the core business processes [14]. BPM focuses on the technology of process management. It was introduced as a key technology in 2010 [28]. Since its introduction on this list it varied between 9th and 16th positions [10,19]. In the most recent SIM survey, however, BPM no longer listed in the top 10 in either the most important management issues nor in the list of the largest IT investments in organisations. It appears 16th in the technology (IT) investment ranking of [18].

Table 2. Top 10 Tech.-issues (top-down) for IT staff and management (2004–2016)

2004: USA [26]	2009: USA, China, EU [24]	2014: USA, China, EU [17]	2016: USA, China, EU [18]
Security technologies	Business Intelligence (BI)	Analytics, Business Intelligence (BI)	Analytics, BI, data mining, forecasting, big data
Business Intelligence (BI)	Server virtualisation	Data center infrastructure	Application software development, maintenance
Business Process Management (BPM)	Enterprise Resource Planning (ERP) systems	Enterprise Resource Planning (ERP)	Security, cybersecurity
Web services	Customer and corporate portals	Application and software development	Cloud computing (SaaS, PaaS, IaaS)
Customer portals	Enterprise Application Integration Management (EAI, EAM)	Cloud Computing (SaaS, PaaS, IaaS)	Customer Relationship Management (CRM)
Data synchro-nisation	Continuity planning, disaster recovery	Customer Relationship Management (CRM)	Enterprise Resource Planning (ERP)
Mobile and wireless applications	Collaborative and workflow tools	Security, cybersecurity	Data center, infrastructure
Enterprise application integration management	ITIL, IT process management practices	Integration, application integration	Network, telecommuni-cations
Enterprise resource planning	Service-Oriented Architecture (SOA)	Network, telecommuni-cations	Integration: application-, data-
Customer Relationship Management (CRM)	Storage virtualisation	Big data	Legacy software: maintenance, update, consolidation

3 Research Method

This paper is part of the 'World IT Project' (arguably the largest global IS academic empirical research project ever undertaken) and followed its research method, the details of which are described in [31]. We collected quantitative data from IT employees by means of a survey in a cross-sectional time-frame. The sampling technique was a mixture between stratified, convenience, and purposive sampling. The World IT Project focusses on larger organisations. The three South African-based ('local') researchers concentrated on the regions closest to their home universities. The instrument was a standardised questionnaire designed by the World IT Project 'core team' to allow for international comparison. The IT issues were based on [25,28]. The instrument was presented as an online survey (205 responses) as well as a paper-based format (105 responses). Only 9 responses had to be excluded because of insufficient quality, leaving 301 usable responses that could be analysed. Generally, the quality of responses was very high, as evidenced in a number of validity tests as well as the high reliability of sub-construct test items where some items were phrased negatively. The data were cleaned in two steps: first by the 'local' researchers, then by the World IT Project core team. 'Statistica' was used for statistical analysis and 'MS-Excel' for some of the descriptive analysis.[2]

4 Data Analysis and Discussion

Of the 301 usable responses, 70% of the respondents were below 40 years old: 38% aged 30–39, and 32% aged 21–29. 72% were male. They were also reasonably well-educated (48% with Bachelor degree, 16% with Master or Ph.D., 11% with merely high-school education). This corresponds well with the IT industry's overall demographic profile. Thus our sample can be regarded as representative of the IT industry (albeit perhaps with a slight bias towards better educated employees). Our respondents appear to be fairly experienced, with one-third of them having 10–19 years of work- and IT experience. Most of them work for large organisations, i.e. those with more than 1000 employees, rather than with medium-sized IT departments (51–100 IT staff). Hence we have a bias towards the larger organisations in line with the intended focus of the World IT Survey. Nevertheless our sample still contains a significant number of employees working in small and medium-sized organisations.

4.1 Top Organisational Issues of South African IT Employers

Respondents were asked to rate 18 organisational issues arising from their organisation's IT engagement according to their perceived relative importance on a 5-point Likert-type scale. Figure 1 presents the results, sorted by the mean. IT reliability and efficiency were clearly of top priority, followed by the IS/business

[2] Ethics-committee approval was obtained from our home universities as well as from the corporates who agreed to participate officially (i.e. by name) in this survey.

alignment and by security/privacy concerns; those were the top three issues. Interestingly, related to the notorious shortage of IT skills in the country, attracting and retaining IT staff is an important issue, but it ranks only 6th. At the opposite end of the spectrum, globalisation and outsourcing are not seen as major issues here in South Africa, and the often hyped 'BYOD' (Bring Your Own Device) issue was not even mentioned.

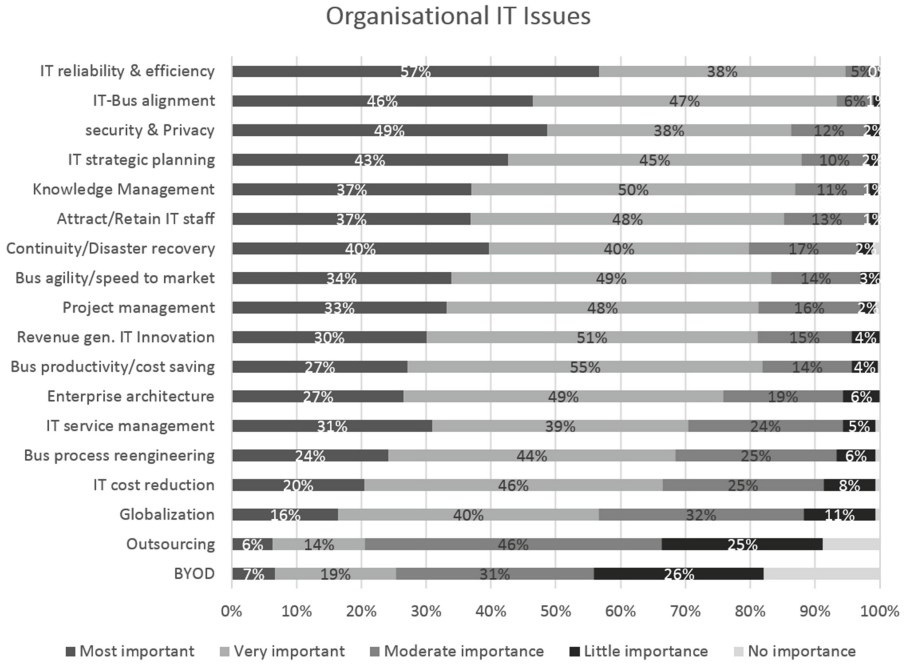

Fig. 1. Organisational issues ranked by South African IT employers ($n = 301$)

Comparing the South African issues with those in the previous SIM surveys we can see that the issues of alignment, security and privacy were also rated as very important: they usually feature among the top three issues both in the USA as well as in Europe and China. Similarly, most of the issues rated as less important in South Africa were also not ranked highly overseas.

However, IT reliability and efficiency, the most important issue in South Africa, did not even rank amongst the top five issues in any of the international surveys. By contrast, [15]—with a different list of issues—found in an admittedly small sample that building a responsive IT infrastructure, IT value management, and service delivery were three of the top four issues; these can arguably be said to align with what we called 'IT reliability and efficiency' in our survey. Also important to note is that attracting, developing and retaining IT skills only came into the top 10 in the 2004 SIM U.S.-American survey alone, and has not featured

again in the later surveys. So there is strong support for the argument that the IT skills shortage is much more acute in South Africa than in the developed world. This underlines the importance of IT education in South Africa.

We also looked at which of the organisational issues that were in the top 10 of the SIM studies were also ranked by at least two-thirds of South African IT professionals as very or most important (i.e., found as part of our 15 most important issues). Remarkably, all of the top 10 issues in the SIM surveys of 2016 and 2014, and 9 of the top 10 issues of the SIM 2009 survey were also considered 'very' or 'most' important by two-thirds of the South African respondents. By contrast, only five issues from the top 10 of the 2004 survey are in our top 15 list (even after mapping 'closely related' issues).

As an additional exercise, we did an exploratory principal component analysis of the issues to see if some issues could be grouped in higher-order clusters using the empirical data. Four larger factors emerged. The factor accounting for the biggest variance in the data groups consists of four items: IT/business alignment, agility, innovation, and IT skills attraction/retention. We can thus perhaps conceptualise these as the issues relating to the organisation reacting to or engaging with its market environment. The factor with the second-largest explained variance refers to distinct internal management abilities or concerns loading the issues of disaster planning, project management, and knowledge management. The third factor loads security/privacy with reliability/efficiency and service management, which appear to group the operational business concerns (two of which feature in the top-three concerns). A fourth factor loads IT cost reduction, productivity as well as IT strategy planning (with business process re-design and enterprise architecture loading more than 40%). These seem like more specific IT-internal concerns, although a more natural descriptor is not so evident. A fifth factor, low in importance, combines globalisation with outsourcing and can thus be seen as one of the international concerns.

The implications for the South African academic IS curriculum appear to be rather small. The issues of aboce are generally all covered quite well by senior or 'capstone' IS management courses at most universities. Of note is that the BYOD, globalisation and outsourcing issues appear to be less important in industry. The relatively high ranking of continuity/disaster recovery planning (7th) belies its sometimes low visibility in many university curricula. The largest surprise is that the rather mundane issue of ensuring a reliable and efficient IT infrastructure is still the foremost concern of IT practitioners, ranked quite distinctly above all other, sometimes much 'sexier' IT concerns.

4.2 Top Technology Issues of South African IT Employers

Under a separate heading the respondents were also asked to rate each of 16 contemporary technology issues w.r.t. their importance on a 5-point Likert scale (from 'most' to 'no' importance).

Like with the business issues, the most important issue stood out quite clearly from the others. In the case of technologies, business intelligence/analytics is seen as the most important technological issue, rated by 84% as 'very' or 'most'

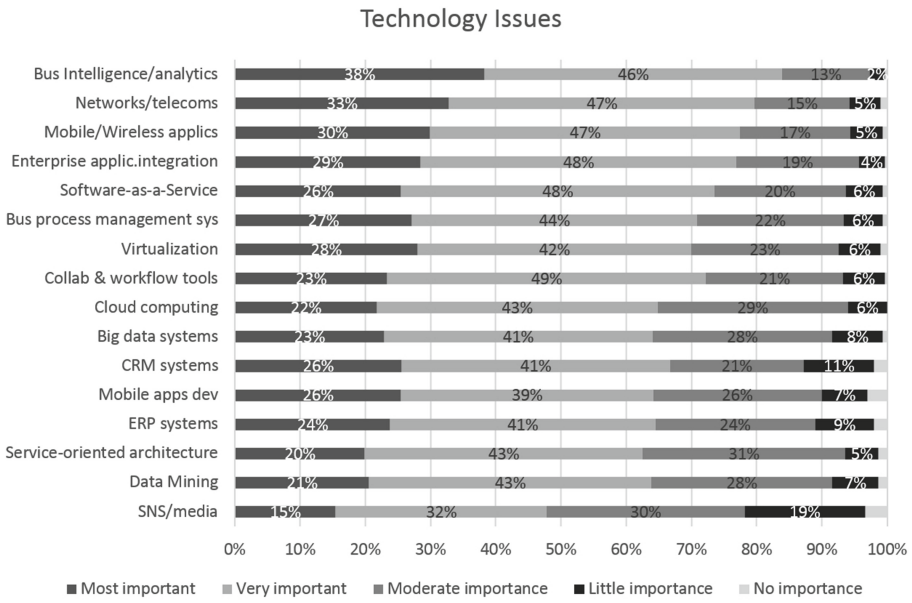

Fig. 2. Technological issues ranked by South African IT employers ($n = 301$)

important; hardly anyone (2%) sees it having 'little' or 'no' importance (Fig. 2). The often undervalued network/telecoms infrastructure is seen as the second most important technical issue.[3] Mobile/wireless applications, partly related to the telecoms issue, came third, and Enterprise Application Integration (EAI)—often hardly visible in academic curricula—were also regarded as 'very' or 'most' important by three-quarters of the respondents. Interestingly, software-as-a-service is ranked 5th, even though cloud computing in general is ranked only 9th. Service oriented architecture (SOA) and data mining were seen by less than two-thirds of respondents as very important technology issues, while social networking systems/media ranked lowest.

This makes for an interesting comparison with the international SIM studies. In all four SIM studies, business intelligence (BI) was also ranked as the top concern. However, our 'second-most important' networking/telecoms issue was ranked only 8th and 9th in the last two surveys respectively, and not evident at all in the prior SIM surveys. Only one of our top six concerns appears in the top six concerns in any of the other SIM surveys, namely EAI (4th in South Africa); it was the number-5 issue in the 2009 international SIM survey. That year, virtualisation (our number 6), was the second-most important issue in the same SIM survey. Perhaps this marks South Africa as 'lagging' in some respects or issues, although the issues of mobile applications, SaaS and cloud computing are definitely recent global developments.

[3] This is perhaps not surprising in a developing country.

We also conducted an exploratory principal component analysis to see which of these issues could be bundled based on their variability. Interestingly, the factor accounting for most of the explained variance in the empirical data loads Business Process Management (BPM), Enterprise Resource Planning (ERP), customer relationship management (CRM) with Enterprise Application Integration (EAI) and workflow/collaboration—these are indeed logically and conceptually linked technologies, which are often grouped together in a single academic course. Perhaps our colleagues lecturing this course can appeal to this fact as support for the importance of their course in our undergraduate major curriculum. The second-largest (w.r.t. variance) factor groups mobile/wireless, app development, networking and social networking/media. The third factor groups not only BI, Big Data and data mining (which are often taught together), but somehow also SOA; (this might just be an accidental 'data artifact'). Finally, virtualisation and SaaS load on the same factor although cloud computing loaded separately on its own factor.

Our findings strongly support the recent importance accorded to BI and analytics given by most universities—not only by the IS or computer science departments but also the management and accounting disciplines. However, the importance of Big Data and data mining seems secondary in this context, indicating that South African organisations still need to master the basic BI tools and apply analytics productively before venturing into more advanced Big Data and data mining applications. Another important finding was that, similar to what we found in the organisational issues context, the most pressing issues are not always the 'sexiest' ones: the rather staid networking and telecommunications issue is rated second-highest, but not necessarily perceived as such by the academic community (except of course for those working in that field). Even more surprising is that EAI is also seen as a crucial issue, even though it is largely absent in most university curricula. The exploratory factor analysis confirmed some of the naturally occurring topic groupings in the typical academic curricula, especially concerning ERP, workflow and BPM, but also BI, data mining and Big Data.

5 Conclusion

This paper identified the most urgent and pressing organisational and IT issues perceived by IT professionals and managers working for South African organisations, i.e., the employers of our graduates. We were fortunate in securing a large sample (301 respondents) representative of South African companies in both geographic diversity and different organisational sizes. Validity analysis confirms that our dataset contains data of high quality.

The *major finding* is that the issues rated as important by our IT students' employers do not always match what the vendors or academics perceive as popular, urgent or current. For instance, a reliable and efficient IT infrastructure was by far the most highly ranked organisational issue, something which is hardly ever foregrounded in our MIS or ISM courses. In the pure technical issues, the

networking/telecommunication infrastructure (often perceived as rather mundane) and EAI (often absent from academic curricula) were ranked as 2nd and 4th most important issues respectively. By contrast, 'sexy' topics such as globalisation, outsourcing, BYOD (organisational) or SNS/Social Media and data mining (technical) were not seen as major issues. Hopefully these findings will lead to some interesting discussions regarding 'capita selecta' topic choices in curriculum design.[4]

Another crucial finding is that attracting and retaining quality IT staff ranked 6th in our survey and is seen as a major organisational issue—unlike in similar surveys conducted in Europe, the USA and China, where this has not been a top 10 issue for the past decade. This vindicates the need for providing more prominence and for plowing additional resources into IT education to address our ongoing IT skills shortage.

Future research could map the key issues more systematically onto the 'official' 2015 ACM curriculum. Given that this survey was conducted in 37 other countries around the world, we intend comparing our findings to those in other developing countries; (sadly, only one other African country has a quality data set so far). We also intend mining our dataset further for differences in rankings according to size of company or role of respondent; space limitations prevented us from including this analysis here. Finally, a longitudinal analysis using standardised methods and instruments may provide further validity and insights into the dynamics of the IT industry and its demands on the educational sector.

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[4] For comparison see the 'Invited Lecture' of SACLA'2018 in *this volume* of CCIS.

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