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Tech Trends 2015
The fusion of business and IT

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Our Roundtable Team

The Deloitte Collaborative Content Series contains points of view created through deliberate and facilitated conversations between our domain experts and selected industry leaders. We believe this to be an ideal mechanism to distil locally relevant and informed perspectives – combining world-class intellectual property with practical, hands-on experience.
Mining and Resources organisations across the globe are all facing challenging and turbulent times as commodity prices fall with reduced global consumption from mega markets. The pressure to revisit and review all operating assumptions has intensified and executives of the most junior to the most senior mining companies all seek to optimise operations at every level.

It is our firm view that technology and the role of the CIO reside at the heart of the efforts to create the truly future-fit mining company. However, challenges facing mining CIOs are ever present. Increasing focus on optimising current technology assets clash with the need to future-proof the workforce while looking to experiment and adopt new, disruptive technologies within an established industry. Budgets remain heavily skewed towards maintaining existing systems while technical debt remains unchallenged.

How then do CIOs respond, and what would their focus need to be to ensure a voice and path from technologist to strategist and catalyst? Where should their focus be, and what can the Mining CIO do to promote effective, efficient operations while maintaining and improving business agility?

The Deloitte Mining CIO Roundtable focuses on the challenges, opportunities and broader environmental constraints facing CIOs in the mining industry today.

We hope that you enjoy this point of view, crafted around the key priorities, challenges and responses of the CIO in the ever-changing and challenging world of Mining and Resources.

Regards

Kamal Ramsingh
Africa Technology Leader

Andrew Lane
Africa Energy & Resources Leader
Contributors

Valda Gossman
CIO, AngloGold Ashanti

As a Business Transformation Leader and Executive, Valda has over 20 years’ experience in driving strategic change within large corporate and government environments. Valda has a proven track record of not only shaping the strategic agenda, but also translating it into a set of executable strategic objectives that focus on value creation and impact.

Toni Serra
Acting Group IT Manager, AECI

AECI is a South African-based explosives and speciality chemicals company focused on providing products and services to a broad spectrum of customers in the mining, manufacturing and agricultural sectors. Having recently joined AECI, Toni is tasked with defining the strategic Information Technology and Information Management plan in alignment with AECI’s strategic plan, for defining the information and technology architecture, managing the IT investment, managing business risk related to information and technology, and providing leadership for all related functions. Toni has more than 30 years’ experience in the IT industry and formerly spent 14 years as the Chief Information Officer with Nampak, Africa’s largest packaging company, and 15 years as the Group IT Manager for Cadbury Schweppes in South Africa.

Ian Brown
CIO, Exxaro Resources

Ian Brown, a qualified environmental engineer, has clocked up over 32 years’ experience in the mining industry. He has previously held the roles of Group Ventilation Manager and General Manager for enterprise risk management, and was appointed as Exxaro’s CIO in 2009, after having worked in the company’s Information Management division for three years.

Robin Buchan
CIO, Glencore South Africa

Robin is the Chief Information Officer of Glencore Operations (South Africa) with outstanding Strategic, Information Technology Service Management, Information Systems, Supply Chain Management, Strategic Sourcing, Business Process Outsourcing, Change Management, Project Management & Process Excellence experience. His career immediately prior to joining Glencore ranged from Mineral Processing Operations through to pure Supply Chain and Information Technology.

Sakhi Simelane
CFO, Mintek

Sakhi Simelane is General Manager: Finance (CFO) at Mintek. He is responsible for the Information Systems, Engineering Service Division and Supply Chain Division to name a few. He previously worked as the Chief Financial Officer of the then Department of Minerals and Energy, and as Chief Audit Executive and Internal Audit Head at the South African Revenue Service (SARS), as well as other institutions in the Public Sector. He has a proven track record in strategic financial management and managing information systems.
New energy paradigms
• There is a new set of energy paradigms driving today’s mining agenda.
• As much as 30% of energy is lost due to energy inefficient mining processes such as poor materials handling and hoisting post the blasting process, including grinding and smelting.
• The degree with which mining companies are able to successfully manage and balance their energy mix will drive significant cost savings in the industry and propel these mining companies into the forefront of effective and efficient resource allocation in their respective sectors.

The future of mining
Most mining companies are “running hard just to stand still”. Incremental improvement is no longer good enough. A step change is required. Analytics and Big Data are at the centre of the innovation required to deliver these step changes. Mining CIOs have a critical role to play as their companies drive to reduce energy, capital and people intensity while driving up mining intensity.

Competitive global mining environment
• We live in an age where competition between economies is driven largely by the businesses and industries operating within these economies, coupled to the degree with which governments are able to provide favourable conditions for Foreign Direct Investment within their borders.
• Differentiation in products and services offered is no longer found in factors such as economies of scale, cost efficiencies, and labour cost balancing but more on the degree to which companies are able to innovate in order to remain ahead of the innovation curve and generate differentiated value.
• There is also a primary need to apply different strategies for different geographies, and there is no “one size fits all” for mining companies operating on a global scale.
How Big is Big Data in Mining?

There is a critical requirement to integrate data emanating from multiple sources in mining environments. Historically, mining operations remained distinctively separated from the world of corporate IT and its daily operations. However, it is now increasingly necessary for data to be sourced and integrated from plant, equipment and other telemetry sources. For mining companies, it is equally essential to recognise what data needs to be collected and the sources of that data, where traditional RFID tagging and data from motion detectors have been well entrenched and understood within the mining sector.
Sourcing and mining plant, equipment and telemetry data for analytics purposes poses a significant challenge as there are no defined guidelines or boundaries with regard to data ownership and limited incentives to collaborate on the use of this data for the general benefit of the mining industry. Mining organisations tend to largely operate in silos – this can be traced back to the pre-mechanised age of mining environments where information was protected and contained within a single mining community. Today, the technology required for extracting and sharing large volumes is available, however there is no overriding appreciation of the value that data mining can provide to mining companies, with the result that existing data warehouses and management information systems are not leveraged to their full potential, and management reports become largely obsolete by the time the information is shared across the value chain. This problem is compounded by the significant variations of reports across individual mining departments, leading to extensive debates on the accuracy and viability of the data and information for reporting purposes. Another significant challenge as it applies to data management is the availability and usage of data that currently resides with external vendors, for example accessing telemetry data that is captured by devices placed on machinery, trucks and other mechanised assets. This data is owned by the vendors and they are not generally incentivised to proactively collaborate on the sharing of this information across the mining value chain. As a result, isolated and disparate information portals are created without a view to create a single, integrated and unified data portal for usage by all the stakeholders in the mining industry. Considering that it is a challenge to get primary access to this valuable source of data, the challenge is substantially amplified in scenarios where data mining needs to be performed on sets of data. In this regard, mining CIOs must actively advocate and champion the cause for data collaboration and information sharing, where IT must act as the catalyst for designing and implementing an integrated information management platform. The engineers may be responsible for capturing relevant data points and telemetry data across the mining value chain but IT needs to own the information integration and information sharing challenge, as this cannot be delegated to the engineers.

This is especially true as CIOs have direct accountability over the new-age ERPs that can facilitate a lot of the data integration and data mining tasks in a real-time or near real-time manner. Rapid advances with in-memory computing and in-memory reporting can expedite the mining and reporting of large sets of information without incurring resource overheads or the need to supplement such ERPs with separate MIS systems. Speed of decision-making is a direct benefit of rapid data mining, where decisions are fact-based, accurate and can provide mining companies with the right information to answer high-impact business questions.

On this front, CIOs need to actively engage in driving the integration of data and data sources across their technology environments and broader IT value chains, including their suppliers and external stakeholders. This would enable the CIO to leverage analytics techniques to uncover the most fundamental problem areas affecting mining companies and have first line-of-sight in addressing these problem areas before they become high-risk to the business. This approach will position the mining company to take the first steps in uncovering actionable opportunities that would deliver direct results in the short-term. Effectively, mining CIOs are in support of a Big Data and Data Mining solution that is able to poll all third-party sources of data from plant and telemetry systems and provide business with value adding analytics and insight. The resultant business value will be derived in the form of preventative maintenance, proactive incident management and better utilisation of existing assets.

Key Takeaway

Big data and data analytics are excellent tools for helping CIOs understand the value that exists within their data. However it still takes a human understanding and interpretation of this data to make any sense of it and to find the intuitive patterns that are invisible to a machine. In South Africa, the Big Data play is still gaining momentum and the forward thinking CIO needs to be ready to deal with the visualisation needs of their data hungry counterparts. This is incredibly relevant as this is where the true data insights and learnings take place. Well-prepared CIOs will be sure to ensure that there is a definite human component to all of their data projects. Finding the value of your mining data begins and ends with data sources. The problem is that those sources are often an unknown quantity. You should understand not only your own data, but also the third-party sources available to supplement and extend your own range of vision.
Cyber criminals are often well-resourced and potentially even nation-state sponsored. They can be highly capable, methodical, and patient – and their tactics keep shifting. Adversaries can gain undetected access and maintain a persistent, long-term presence in critical IT environments, operating below the radar of the mining organisation’s cyber team.
Meanwhile, many mining organisations may have a false sense of security, perhaps even complacency, resulting from their investments in non-agile security tools and processes that they have relied on for years. Yet firewalls, antivirus, intrusion detection systems (IDS), and intrusion prevention systems (IPS) are increasingly less effective as attackers leverage encryption and other innovative techniques to evade them. Many companies are failing to detect long-dwell cybercrimes in their IT environments and misallocating limited resources to lesser, more generic threats.

This presents a very real challenge for mining companies as connected IP and telemetry devices present ripe hacking opportunities for cyber criminals, where entire machinery and vehicles can be deliberately hacked and manipulated to result in catastrophic failures or shutdowns of entire plant production processes.

Building a resilient and proactive cyber programme requires a systematic enterprise-wide approach for mining companies – equal parts governance, change management, process redesign, and technology. The people and operational impacts are also very significant. Mining organisations should build out capabilities to defend, detect, model, predict, respond, isolate, and recover in order to prepare for advanced threats to their operational environment.

The implications for the CIOs of mining companies are very significant and position the CIOs at the very centre of the cybersecurity challenges and requirements that business expects in order to safeguard itself against planned or ad hoc cyberattacks. The mining CIOs can leverage a risk-based approach to managing cyber threats and start with the assumption that an unauthorised user can gain access to the system. This calls for prioritising data and information based on value to the mining company. The mining company can then decide which data to focus which resources on, how much to spend, and which tools to use to protect data.

Key Takeaway
Security of data and business critical information is an immediate priority for any South African CIO. Hackers are getting faster and “better” at hacking systems; and while this does not mean that every company is definitely going to get hacked; it does mean that CIOs need to arm and prepare their organisations to be ready with how they deal with a hack attack should it happen. In South Africa the proactive CIO is already ensuring their system integrity and resilience to attack by putting countermeasures in place to minimise any potential damage. Understand the external cyber-threat beacon of your organisation – the market value of stolen intellectual property in your industry and, specifically, in your company. Tap into external intelligence to understand the broader threat landscape. Then look inward and catalogue your high-risk assets – either because of high potential for monetisation if stolen, or critical business impact if breached.
Simplifying Legacy Technology Platforms

Reversing technical debt is a critical requirement in mining organisations as historically there has been a proliferation of applications and systems that have introduced complexity, rigidity and delayed responsiveness in dealing with critical business issues.
This problem is substantially amplified when business leaders are either influencing or directing CIO decisions on core applications and systems that are needed to support the business without considering the technology standards and create scenarios where CIOs need to support a variegated mix of diverse technology platforms.

This has resulted in the accumulation of a variety of applications and platforms that have either morphed and grown beyond their originally intended functionality, or have become so deeply embedded into the technology architecture that they directly limit the flexibility and scalability of the architecture itself.

For IT to help drive business innovation, managing technical debt in mining companies is a necessity. Legacy systems can constrain growth because they may not scale; because they may not be extensible into new scenarios like mobile or analytics; or because underlying performance and reliability issues may put the business at risk. But it’s not just legacy systems: new systems can incur technical debt even before they launch. Mining companies should purposely reverse their debt to better support innovation and growth - and revamp their IT delivery models to minimise new debt creation.

It is also important to identify the custodians of these legacy and new systems that contribute directly to technology debt in order to develop pathways for minimising the accumulation of technology debt as a priority. In rationalising the technology estate for mining companies, opportunities for cost optimisation across this estate, including the virtualisation of servers within data centres, means greater control for managing business continuity and disaster recovery planning as well as enabling the mining organisation to scale in direct proportion to internal growth opportunities, such as product and services developments or expanding into new geographies.

**Key Takeaway**

When CIOs operate like venture capitalists, “technical debt” is a big part of the financial picture. Without a clear view of the real cost of legacy systems, CIOs lack the information required to make effective decisions about new initiatives and investments. While it’s important not to get obsessed with technical debt, it’s also critical to understand and plan for it. Every new project automatically comes with technical debt as a cost of doing business. Reversing technical debt is a long-term investment, but if left unaddressed, it can bankrupt your ability to build for the future. Capers Jones, a long-term technical debt specialist, once said: “If you skimp on quality before you deliver software, you end up paying heavy interest downstream after the software is released for things you could have gotten rid of earlier, had you been more careful.” He was right.
Can a Revamp of Mining Business Processes Lead to Improved Business Innovation?

Innovation in mining happens directly within the business process layer as it is these business processes that are used to deliver innovative products and services across the mining value chain. Innovation stems directly from interrogating the inherent tasks and activities informing each business process and this can lead to a substantial mind-shift in promoting sustainable innovation within the mining ecosystem.
By integrating mining, energy and information technology into the mine and process design in an innovative way, it is possible to achieve radical business process improvements. Additionally, an integrated systems design typically leads to new process performance levels that are not generally possible on an incremental basis. With a combined system of interconnected devices and processes, it is often simpler, less risky and far more profitable to address and resolve multiple problems and constraints at the same time.

To achieve this, however, it is imperative that process owners and process stewards own the entire business process and own supporting technology enablers. Process owners typically have significant insights into the workings of end-to-end business processes and should take full responsibility of the management and coordination of the moving parts that cover an entire business process within mining organisations.

This is imperative as mining processes typically cut across the entire value chain, for example the “Procure to Pay” and “Order to Cash” processes, and assigning dedicated process owners that serve as the custodians and champions for the processes is a huge lever for extracting greater value (both process effectiveness and process efficiency) from these cross-functional processes.

Additionally, process owners need to work together with the CIOs and provide them with information on maximising the use and scope of technologies to better enable the process. Each touch-point across the process lifecycle can serve as a valuable node for collecting information on the inputs, processing and outputs specific to that process node. Working together with the CIO can help resolve process constraints and bottlenecks that prevent the process from functioning optimally across each of the functional areas.

Organisational process forms the backbone for mining companies and are one of the most important assets that drive real business and customer benefits across the mining value chain. Having CIOs lead from the front with regard to understanding the core business architectures and associated business processes is an important indicator of the CIOs business excellence and leadership credentials, especially as they apply to the industry within which the CIO operates. This can help position the CIO and his IT team as a trusted advisor to the business and shift the business’ perception of IT from being a service provider to being a strategic partner.

**Key Takeaway**

Creating a vision for driving innovation is the often-forgotten third role of CIOs. Beyond running the business of IT and delivering IT to support the needs of the business, CIOs should be leading the charge toward innovation through emerging solutions and technologies and including the design of core business processes as an enabler for innovation. The magnitude of needed change is likely to shift over time, but a mixture of incremental advances (using the organisational processes as the starting point) across disruptive innovations will likely be needed to progress the organisation toward a more competitive – and more profitable – position.
Can Mining CIOs Adequately Balance Operational and Innovation Agendas?

There is a general consensus that mining CIOs spend the majority of their time managing the business of today as opposed to promoting and building the business of tomorrow. As a result, there is very little capacity (and funds) that can be directed to developing innovative Proof of Concepts and Pilot projects that push the innovation and business transformation agenda, where experimentation and invention is encouraged and rewarded. CIOs are left with a challenging conundrum of where best to allocate their time and how to create enough space to effectively manage both the operational and innovation needs of the business.
CIOs should “Think Big, Start Small, Fail Fast (should the opportunity not yield expected results) and Scale Quickly (should the opportunity yield expected results)” in order to embrace technology disruptors and remain at the forefront of technology advances, rapid prototyping and agile development cycles.

In order for leading-edge initiatives to gain traction, it is important that CIOs seek relevant support from business executives that manage the budgets and allocate the funding for IT services.

New and innovative projects need to be prioritised and afforded the opportunity to be trialled in the organisation. This can be supported by deploying short implementation cycles (using rapid “Proof of Concept” trials and internal “Pilots”) to ensure that the proposed solutions remain relevant once implemented. Lengthy implementation cycles foster technical debt and typically embed solutions that may be largely outdated by the time that they are instituted in organisations. On this front, CIOs need to define what they want to achieve over a 1-3 year cycle so that those requirements are fed into the investment pipeline and become candidates for innovation and advancement.

A challenge that CIOs have is the rate of change of the regulatory environment vis-à-vis the technology environment, especially as it applies to data residence and sovereignty.

CIOs can also focus on delivering small initiatives that collectively make a huge impact, e.g. the introduction of instant messaging services to promote real-time collaboration. Such technologies can significantly reduce an organisation’s travel and communication expenses and it is a relatively simple solution to deploy across organisations.

With respect to piloting and introducing new technologies into the mining organisation, CIOs are also faced with the challenge of acquiring, growing and retaining the right talent and skills needed to better prepare the mining company for the immediate and medium-term futures. Scarcity of technical talent is a significant concern across many mining companies, with some companies facing talent gaps along multiple fronts.

The legacy-skilled workforce is retiring, and these companies are scrambling for needed skills in the latest emerging, disruptive technologies. To tackle these challenges, companies will likely need to cultivate a new IT resource profile - the IT worker of the future - with habits, incentives, and skills that are inherently different from those in play today. For mining CIOs, the implications are that they need to be at the forefront of developing forward-based talent strategies, where the recruitment for non-IT skills such as behavioural scientists, graphic designers and user experience engineers are considered in equal proportion to the traditional IT skills that focus on application development and service delivery.

**Key Takeaway**

Today, the CIO plays multiple roles inside an organisation; with the traditional back office role forming only a small element of it. To this end the fact that the CIO needs to be a change agent is incredibly relevant in South Africa. The digital revolution is happening as we speak with employees demanding the same level of sophistication from their enterprise applications as they receive from the applications they use in their personal capacities. Aim to seed innovation by creating a pocket within your organisation that has goals involving research and development (R&D). This can be heavier on development, but it is important to explore the five post digital forces and identify specific ways they can be applied to improve your business. Ask vendors and other business partners to fuel the idea creation process – not with abstract rhetoric, but with real examples with tangible outcomes.
Mining organisations are investing in virtualisation, infrastructure as-a-service and other cloud-based solutions. OEMs are, however, unable to change their commercial model to meet the organisation’s requirements. The lack of agility from incumbents is also driving rapid innovation at the edge, for example SFDC, Google and Amazon services.
Mining companies buy the products because that is the way that the vendors actually sell them, and the CIO community needs to push for change on how the products are sold to the organisation. IT is becoming highly commoditised and CIOs should not be held at ransom by OEMs. CIOs need to buy a process capability as opposed to software and this should be what OEMs are focused on providing.

Moreover, Cloud TCO has been generally “oversold” and vendors need to think of value-driven commercial models to provide solutions that speak directly to the needs of the mining industry. “Sell me an end-to-end process enablement capability, not a software solution”.

On this front, mining CIOs need to be acutely aware of both the opportunities and pitfalls in embracing “as-a-service” offerings that have become commonplace and largely commoditised in the IT services industry. Some important considerations for CIOs in managing “as-a-service” offerings include:

• Ensuring that a solid business case is produced prior to investing in cloud-based services, to be savvy and realistic about what cloud-based services can offer, and looking at the business beyond the technology components.
• Considering the movement and progression of vendors. Vendor space has matured but will still evolve depending on the types of services being sold.

In the near term, cloud-based services are focused on workloads at the edge, predominantly capacity. Though some services are shifting to higher order functions like security and analytics, it will likely be a few more years before core capabilities move to the cloud in earnest.

**Key Takeaway**

Many companies could save money if cloud pricing was based on usage and outcomes rather than licensing fees. If this is true for your organisation, let the cloud providers know. Also, develop a healthy scepticism of cloud provider contracts. Understand your rights to data ownership, portability, and migration. If you change providers, can you be confident that your data is protected? Negotiate terms where possible to maintain your flexibility.
Can Mining Suppliers Serve as Strategic Partners?

We live in an age where stakeholder collaboration is not only a prerequisite to being a successful, profitable business, but is also a key criterion for business continuity and survival – the digital age requires and mandates strategic collaboration with all the critical touchpoints of a business, including customers, suppliers and oftentimes, competitors.
It is imperative that mining companies establish collaboration forums with all the key stakeholders in their value chains and to leverage the power of new-age collaboration tools to actively promote, discuss and resolve high-impact issues that directly affect the effectiveness and efficiencies gained or lost across the entire value chain. For example, suppliers of blasting material and mining explosives can collaborate with the mining engineers to better understand the attributes required for an optimum rock blast. Mining engineers presently sensor the blast area to collect vital information on blast radius, blast temperature, blast strength and blast size. This information can be more readily shared with the suppliers of explosives to develop more effective blasting material, where blasts can generate greater depth penetration and yield more “value per blast”.

Over time, mining engineers can collect a broad range of empirical data and build up a library of valuable data sets as they apply to machines and devices (telemetry), geographical area and composition of ore, blast analytics, energy consumption data on large machinery such as crushers and mills, as well as optimal heat data for smelting ore and other precious metals. The collation and sharing of this information can be a huge differentiator in the collaboration age where information sharing is directly proportional to competitive advantage.
Additional collaboration opportunities, enabled by the rapid advances in technology include:

**Collaboration with drone manufacturers.**

Drone manufacturers can collaborate with mining companies to develop robotic devices that provide advanced manoeuvrability and access to high-risk mining areas for assessing gas leaks or taking high-resolution photos for assessing new ore veins that can be drilled, sampled and assessed for financial viability.

**Collaboration with cognitive analytics partners.**

The rise of cognitive analytics can provide mining companies with immediate, informed and pertinent information as it relates to key questions or concerns that the mining community may raise. Cognitive analytics is also able to rapidly identify correlations between seemingly incongruent attributes and draw inferences that would not normally be possible using standard data analysis techniques. Questions such as, “What is the relationship between weather patterns and power consumption at the mines?” can be resolved using cognitive analytics.

**Collaboration with geospatial applications and service providers.**

Usage of RFID tags that can track and trace the movement of goods and services throughout the mining ecosystem. The mashup of RFIDs with advances made in geospatial technologies can provide real-time geospatial information on the location and movement of any asset.

**Collaboration with augmented and virtual reality partners.**

The exponential investments made in developing augmented and virtual reality devices, such as the Oculus Rift and Microsoft’s HoloLens can provide enormous opportunities to prototype and develop use case scenarios for the mining community. As an example, real-life mining scenarios such as shaft development and blasting can be simulated in a virtual environment that can be used for the benefit of training miners on the potential hazards that can be encountered in the real world.

**Collaboration with wearable device manufacturers.**

The availability of wearable devices, such as wrist straps, can provide mining management with real-time information on the health and well-being of miners, as it relates to measuring vital health statistics and indicators. Factors such as blood pressure, heart rate and perspiration rates can be rapidly collected and assessed for preventing and averting mining fatalities. This is a significant requirement for global mining companies where the health of miners and proactive prevention of mining fatalities is topmost on both the Government’s and CEO’s agenda.
The role of the CIO in promoting and facilitating greater collaboration with key suppliers and technology partners is becoming the catalyst for change. CIOs need to move away from being perceived as operational overseers and custodians of the “system of record”, and be seen to actively drive, own and sponsor better collaboration with its suppliers and participants in its value chain and business ecosystem, where collaboration leads to elevating innovation and modernisation as foundational pillars for supporting the “Mine of the Future”.

**Key Takeaway**

Today’s CIOs have an opportunity to be the beating heart of change in a world being reconfigured by technology. Every industry in every geography across every function will likely be affected. CIOs can drive tomorrow’s possibilities from today’s realities, effectively linking business strategies to IT priorities. And they can serve as the lynchpin for digital, analytics, and innovation efforts that affect every corner of the business and are anything but independent, isolated endeavours.

Knock down organisational boundaries wherever you can. Tap into your employees’ collective ideas, passions, and interests. Create crowd-based competitions to harness external experience for both bounded and open-ended problems. Foster new relationships with incubators, start-ups, and labs with an eye to obtaining not just ideas but access to talent. Set explicit expectations with technology vendors and services partners to bring, shape, and potentially share risk in new ideas and offerings. Finally, consider if cross-industry consortia or intra-industry collaborations are feasible. Integrate the minds, cycles, and capital of a broad range of players to amplify returns.
Our Roundtable Team

Lead Facilitators

Kamal Ramsingh
kramsingh@deloitte.co.za

Andrew Lane
alane@deloitte.co.za

Twitter: @DeloitteSA
www2.deloitte.com/za/en

Industry and Technology Specialists

Coenrad Alberts
Hester Swart
John Karageorgiou
Michaella Kissack
Kamlesh Pillay