ANNUAL REPORT 2018 – INFORMATION COMMUNICATION SYSTEMS

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UNIVERSITY OF JOHANNESBURG | INFORMATION AND COMMUNICATION SYSTEMS

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EXECUTIVE SUMMARY

The Information Communication Systems Division (ICS) is the internal Information and Communication Technology (ICT) service provider to the University of Johannesburg (UJ), and the institution's central ICT Division. It has the task of dispensing enterprise ICT systems and services for all UJ staff, students and partners, which is done through efficient and effective planning, implementation and support of ICT technologies and innovations.

With the responsibility of taking on digital transformation and other business critical projects, the role of ICS is more visible than before. Between maintaining infrastructure, coming up with new ways to use information and data to drive business forward, and leading digital transformation efforts, ICS still needs to maintain service levels and ensure stability of ICT systems and associated infrastructure.

Strategic Alignment

As a key player in the GES (4.0) journey, the Information and Communication Systems (ICS) Division has launched an innovative Programme, ICT 4.0 Strategy, to achieve its strategic vision in alignment with Industrial Revolution 4.0. The following areas were assessed during the strategy development:

- The existing ICT landscape in UJ was revisited/studied in terms of ICT Vision, Mission, Values;
- Infrastructure Backbone;
- Application Services;
- End User Support Services;
- Team and organisational structure;
- ICT process implementation effectiveness and adoption readiness for Future ICT Technology.

The ICT 4.0 Strategy is based on a framework comprising components (sub-strategies) and enablers. The strategy components (sub-strategies) will enable ICS to achieve its vision and meet its objectives, while the enablers will provide the necessary governance and competencies to ensure that the end strategic goals are delivered.

The ICT 4.0 Strategy consists of the following sub-strategies:

- **Service Strategy:** To deliver better, cost-effective and efficient services to UJ stakeholders;
- **Information Strategy:** To maintain integrity, availability and accuracy of university information and data across UJ business processes;
- **Application Strategy:** To deliver the required business functionality with lower Total Cost of Ownership (TCO), easy maintainability, and reduced delivery time;

- **Infrastructure Strategy:** To provide a high performing, reliable, energetic/dynamic and cost-efficient environment to run ICT services, ensuring high availability and supporting the UJ future expansion plan;
- **Security Strategy:** To protect confidentiality, integrity and availability of information by establishing physical and logical controls in alignment to UJ's strategic goals and its risk profile;
- **Sourcing Strategy:** To procure services through the right partners with the right quality, at the right price and with the right controls, along with building resource competency within ICS to reduce dependency on partners;
- **Digital Strategy:** To create a suite of digital services to complement UJ's built environment and physical service delivery to create valued experience for its stakeholders. Establish partnerships with external entities through Digital Eco Systems and through Next Generation Technology (NGT) adoption.

Vision

The Vision of ICS is to be recognised as the pioneer in delivering ICT services among African Universities. This will be achieved by demonstrating and proving how ICS engages with university functions, understands institutional objectives and technology needs, and delivers improved customer satisfaction, better service performance and optimised ICT operations.

Mission

ICS will strive to provide and protect an environment that features 'IT Abundance', wherein IT infrastructure, services, and solutions are innovative, readily available, and utilised to provide exceptional support to students, faculty and staff in their endeavours to uphold the UJ's 2025 Strategic mission.

INFORMATION COMMUNICATION SYSTEMS DIVISION

The Information Communication Systems (ICS) Division is tasked with the planning, implementation and support of core Information and Communications Technology (ICT) systems and infrastructure services within UJ. The ICS Division currently comprises the following units:

- Infrastructure ad Operations Support;
- Networks and Telephony;
- Technology Architecture and Planning;
- Solutions Delivery;
- Enterprise Systems Management;
- IT Service Delivery;
- ICT Governance and Strategy.

ICS embarked on a process to review its structure and skills capabilities across all ICS units. The ICS structure review focussed on the Next Generation Technologies, to be

achieved through an internal transformation journey, covering the re-skilling of the existing team and a cross-skilling exercise, so that resources can be utilised in an optimal way and ensuring that the required new skills can be acquired through talent attainment.

Infrastructure and Operations

The Infrastructure and Operations unit ensures an up to date, stable, secure and dynamic server infrastructure for the University, which includes Microsoft Windows and Linux servers consisting of both physical and virtual machines. The environment supports business critical applications such as:

- A hybrid email infrastructure hosted on premises as well as in the O365 cloud;
- UJ web SharePoint infrastructure;
- Perceptive Content;
- Student Management Systems;
- Enterprise Resource Planning (ERP) – Oracle;
- ICS central helpdesk and change management system.

Other critical functions provided by this unit include monitoring, securing, backing up and restoring of IT systems. The unit manages the staff lifecycle process, aligned with HR processes, and provides authentication for all student systems e.g. student email and ULink.

Network and Telephony Services

The ICT Network and Telephony services unit designs, develops and maintains UJ's network, internet, telephony, VPN services, and network security infrastructure, which span across four campuses and remote offices, providing seamless and secure connectivity to all stakeholders. This unit is also responsible for the provisioning and support of WiFi connectivity to all libraries, lecture venues, student residences, student centres as well as the WiFi "HotSpot" areas located throughout the University. The unit manages the Telephone Management System and the BULK SMS service which is used as a key communication tool to students.

Technology Architecture and Planning

The Technology Architecture and Planning unit is responsible for the design and maintenance of UJ's ICT blueprint together with the planning and implementation of the long-term architecture roadmap. This unit also consults with UJ's communities and key stakeholders to discuss and recommend fit for purpose ICT solutions including the piloting of new technology innovations. Other critical functions provided by this unit include the management of ICS facilities such as critical data centre infrastructure.

Solutions Delivery

The Solutions Delivery unit is involved in the development and integration of new ICT software applications that are custom built to UJ's needs, while also enhancing and

maintaining current ICT applications that are already in production. This mandate is accomplished by first understanding business processes at Faculties and in support departments. Once these processes are understood and analysed, the next step is to identify gaps and/or opportunities for enhancements, in order to improve the experience of clients (who are generally students) in interacting with said areas.

Enterprise Systems

The Enterprise Systems Management unit is tasked with the deployment and maintenance of systems that support UJ's core mission of Teaching and Learning. These systems include:

- Enterprise Resource Planning (ERP) - The Oracle eBusiness Suite
- ITS Student Information System
- Perceptive Content
- UJ's Business Intelligence (BI) platform and the Celcat timetable system.

The other critical function provided by this unit is second level support to the Higher Education Data Analytics (HEDA) platform, which provides information management and executive decision support to UJ senior management community.

IT Service Delivery

The IT Service Delivery unit acts as an interface between ICS and the UJ community. The primary focus of the unit is to provide uninterrupted client services and support. IT Service Delivery provisions the human and technology resources to enable and support UJ's teaching, learning and research as well as students and staff members respectively. The core functions of the Service Delivery unit include provisioning and maintenance of Audio Visual Services, Networking and Telephony client services, including Wi-Fi and computing services in all staff and Computer Lab environments. The function comprise multiple teams with various professional support focuses. The Service Delivery Teams include:

- The Centralised Help Desk
- Desktop and Network Support
- Audio Visual Services and Student Computing.

In view of the widespread rollout of WiFi and the need for students to acquire own devices, the IT Service Delivery department started an initiative to support students with setting up of their devices, to ensure that they can connect effortlessly to the network through service windows and student labs.

ICT Strategy and Governance

The ICT Strategy and Governance unit is responsible for the implementation of ICT Strategy, Cyber security strategy and IT Governance framework for UJ, as follows:

- Providing oversight of all ICT projects, ensuring that the PMO is managing and delivering all ICT Projects in an efficient and effective way, within budget, at the right time and of the right quality.
- The ICS Division's policies and procedures are documented and approved in order to secure UJ's information assets as well as mitigate risks associated with the use of ICT.
- Management and coordination of both internal and external audits, ensuring compliance with policies, rules and regulations such as the Protection of Personal Information Act (POPIA) and the Electronic and Communications Act (ECT ACT).
- Management and facilitation of all ICT disaster recovery activities as well as scheduling simulations of system failures in order to test the effectiveness of disaster recovery processes. This ensures that UJ is always prepared for systems related disasters.

GOVERNANCE AND COMPLIANCE

Governance Framework

The ICT Governance Framework acts as a link between the university's strategic objectives and IT decisions, to enable the achievement of objectives set forth at university level in alignment with GES (4.0) and IR 4.0. In terms of establishing an ICT Governance Framework, UJ is instituting a decision-making ecosystem to ensure that ICT services support and extend the university's strategies and objectives in a sustainable manner.

The ICT Governance Framework at UJ is centred on three key elements:

- **Leadership and Organisational structures** for specifying the decision rights and accountability framework, in order to encourage desirable behaviour in the use of ICT
- **Processes** that enable smooth and sound decision making
- **Mechanisms** that help to adopt governance practices, and review and measure and also monitor performance and accountability, while focusing on strategic alignment with other departments and functions of UJ and ICS

The UJ ICT Governance Framework is a Hybrid Framework modelled on universally adopted frameworks and aligned with UJ's strategic vision to become Industry 4.0 compliant.

ICS is undergoing transformation in terms of its operating model from Distributed to Centralised across the whole university. This will include ICT services from areas such as the Library, CAT, Engineering and Protection Services. All ICT related investment planning in terms of hardware, software, ICT services and any other ICT related decisions are to be routed through the newly formed ICT Steering Committee, to ensure optimum utilisation of the university ICT budget and resources.

Compliance

UJ handles massive personal information. Uncontrolled access to personal data of individuals may cause distress for the University, and could also bring financial, legal and reputational risk for the University. By following a set of principles, rules and regulations defined as per the Protection of Personal Information (POPIA) and General Data Protection Regulation (GDPR) Acts for collecting and processing personal information, the data privacy risk can be avoided, and this will strengthen data protection and privacy preservation.

Protection of Personal Information

The South African ACT 4 of 2013, Protection of Personal Information (POPIA), was enacted to give effect to the constitutional right to privacy by safeguarding personal information.

General Data Protection Regulation

The legal framework General Data Protection Regulation (GDPR) came into effect on May 2018 for all European Union member states, as well as where data are transferred to or from the EU. Hence, UJ has to comply with South African Law (POPIA) as well as with EU law (GDPR) while dealing with personal information from European Union member states.

Both POPIA and GDPR prescribe specific principles for the lawful processing and use of personal information. However, both share much commonality. During implementation, appropriate decisions must be taken by ICS to inherit and implement processes guided by principles of both POPIA and GDPR.

Audits

ICS is audited a part of the annual institutional audit programme. The results and recommendations from the audits are implemented and mitigation actions are documented and presented to several UJ governance bodies, including PRCC, RMC and ARCC.

SUMMARY OF KEY CHALLENGES AND RISKS

ICS is constantly faced with challenges brought about by the ever-changing technology landscape and the operational demands on its resources, and some of these challenges and risks are noted below.

Key challenges

Maintenance backlog

Most of the ICT infrastructure (audio-visual, network, Wi-Fi and end-user computing devices) has aged or reached end of life. Inadequate funding over the years is a major challenge, which has resulted in maintenance backlog and equipment failures.

Funding constraints

Due to the limited implementation of private cloud infrastructure (IaaS), funding to consistently maintain and provide required server infrastructure and storage remains a challenge. This also applies to the audio-visual infrastructure funding requirements for all the teaching and learning venues.

Scarce skills set

As new technologies become available, the need increases regularly to upskill staff in hardware on various platforms. ICS has one highly skilled hardware expert available, which poses a risk to the University, should this staff member decide to further his career elsewhere. This also applies to other sections within ICS, such as architecture and planning, networks security management and cyber security.

It is also a challenge to meet rapidly increasing business demands on time, due to limited budgets and limited skilled resources.

Human capital constraints

ICS has hitherto been able to meet the expected deliverables and key initiatives, but is faced with the lack of required resources to meet these deliverables. To meet the strategic objectives of the University and reduce the reliance of ICS on external consultants and service providers, the limited staff and costs constraints must be addressed.

Key risks

ICS maintains a risk register that is reflective of all the risks being tracked. A scheduled review of risks and associated mitigations takes place monthly as part of the Risk and Audit meeting attended by all Senior Managers and chaired by the Chief Information Officer. There are initiatives in place to address all identified risks, the status of which is reported regularly at the Risk Management Committee of Council. The following are key risks in ICS.

Threat of cyber attacks

Cyber security continues to be a major risk to the University and has become even more significant as UJ embarks on the Fourth Industrial Revolution journey. ICS has placed emphasis on the cyber security risk by embarking on an initiative to implement a cyber security strategy that touches on policies, processes, technologies and resources.

Data centre (DC) rebuild

The APB and DFC data centres need to be rebuilt with energy efficient DC equipment and design. These data centres have never been rebuilt to take advantage of newer technologies and have not been fire-rated.

SUMMARY OF KEY ACHIEVEMENTS

The following key deliverables were achieved in 2018, namely:

- Infrastructure modernisation
- Systems and infrastructure upgrades

Infrastructure modernisation

Private cloud: Infrastructure as a Service (IaaS)

Infrastructure as a Service (IaaS) allows the usage of infrastructure resources, such as computing, networking and storing, as a service. At UJ, ICS implemented IaaS, which allows ICS staff to rapidly provide the required virtual servers. The provision of size of the servers is currently limited due to budget restrictions, and when a larger server is required, physical hardware still needs to be purchased. This private cloud is configured for all four campuses − APB, APK, DFC and SWC. ICS also has a disaster recovery site.

Implementation of security tools

ICS has implemented the following security tools.

- Qualys Vulnerability Management (VM)
  Qualys VM continuously scans and identifies vulnerabilities on the ICS infrastructure. This tool can uncover unanticipated devices that are connected to our network that can leave the network exposed to cyber-attacks.

- Symantec Endpoint Encryption
  Laptops provide our staff the freedom to work anywhere and at any time. This freedom comes at a greater risk of data breaches through lost or stolen devices. Symantec Endpoint Encryption combines strong full-disk encryption with centralised management to protect sensitive information.

Network reconfiguration for cluster optimisation

ICS reconfigured the network for the chassis hosting critical servers and the Enterprise Business Systems (Oracle and ITS) clusters to optimise data throughput and increase network stability. ICS enabled high availability by isolating the various traffic types used by the different systems and putting in place redundant high-speed uplinks back to the data centre network core.

Storage expansion

ICS upgraded the storage array that contains our Oracle EBusiness Suite systems data. The storage expansion not only increased the overall usable capacity, but also greatly increased data throughput by utilising high-end read and write intensive solid-state drives.

Telephony systems virtualisations and installation of unified communication system

The telephone system is aging and has reached manufacture lifespan. There was a need to upgrade and renew the telephony system, which is currently based on old analogue and digital lines technology. ICS installed a virtual server (private cloud solution), which is an IP based unified communication system, to replace the aged PABX hardware.

Systems and infrastructure upgrades

ITS Student Management System upgraded to the latest version

ICS successfully upgraded the ITS Student Management System to the latest version, as previous technology had reached end of life and was no longer supported. The upgrade brought several business benefits, such as the reduction in local software programs, now replaced by standard functionalities, which results in ease of support.

Electronic Submission of Assessments System

This application enables academic staff to upload all their assessments for a particular assessment period. Central Academic Administration (CAA) is now able to securely retrieve and print the assessments for distribution during the assessment period.

MARKS declaration portal

The aim of the project was to enable both support and academic staff members who work with the Management of Assessment of Marks System (MAMS), to declare a conflict of interest with a student who is currently registered at UJ.

Fibre upgrades and high availability on APK

ICS installed new fibre network cables around the APK Campus from A Ring to E Ring, upgrading from 1Gbps to 10Gbps, in order to achieve an increased network capacity, better reliability, and lower total cost of ownership, and to ensure network high availability. This upgrade will ultimately provide the flexibility for a “Fourth Industrial Revolution anytime anywhere network”.

Wi-Fi expansions and upgraded Internet lines on all campuses

ICS has been rolling out Wi-Fi in student areas, such as libraries, lecture halls, open areas and student residences. In 2018, ICS further expanded the Wi-Fi coverage and upgraded the Internet to a 10G line in areas where the signal was not adequate, in order to address the connectivity requirements.

Firewalls (next generation firewalls)

To further strengthen the security of the University’s IT infrastructure, ICS installed additional firewalls on APK and APB Campus. The next generation firewalls are capable of handling advanced threats from the Internet. ICS has installed these

firewalls between APK Campus and external houses and has extended the high availability capabilities on APK Campus in order to address the issue of redundancy.

Eduroam roll-out

Eduroam (education roaming) is a secure, world-wide roaming access service developed for the international research and education community. UJ has been part of Eduroam since 2012, which allowed UJ staff travelling to other universities worldwide to connect and have Wi-Fi access. During 2018, the ICS Department made Eduroam available on all four campuses at the libraries, student centres and Madibeng area.

High performance computing cluster (HPCC)

HPCC is an open source data-intensive computing system platform that provides a reliable, scalable and centrally managed research computing facility to UJ's researchers. This provides the users of the cluster with more processing power and storage than would otherwise be available to them. The UJ cluster is also part of the worldwide computing grid; it participates in both the Open Science Grid and the South African National Computer Grid.

In 2018, ICS onboarded more departments to make use of UJ's HPC facilities. Research topics range from biodiversity and conservation to genetic studies, and the cluster was used in inter-university research projects funded by the National Research Fund. Such research is undertaken by both master's and doctoral students and UJ research staff.

WHAT THE FUTURE HOLDS

ICS has embarked on an initiative to develop a full Digital Transformation Strategy for the University of Johannesburg, in order to achieve UJ's strategic vision of alignment to the Fourth Industrial Revolution (4IR).

The main objective of the Digital Transformation Strategy (ICT 4.0 Strategy) is for ICS to position itself as a strategic enabler that will energise UJ's growth in alignment with the 2025 strategic objectives. To develop this ICT 4.0 Strategy, ICS partnered with a consulting company to develop a Digital Transformation Strategy and Execution Roadmap.

Outcomes of the ICT 4.0 Strategy Framework:

- Digital Transformation Strategy (ICT 4.0 Strategy)
- ICT Governance Framework
- Organisational Structure and ICT Resource Plan
- ICT strategic goals for the next three years
- ICT Roadmap and Priority Matrix
- Proposed execution/implementation schedule

Strategic goals: 2019-2021

ICS needs to establish digital capabilities underpinned by robust technology services. These digital capabilities create value and opportunities that can benefit all customer communities. The investment required to strengthen or create the digital capabilities needs to align with the vision and principles of ICT 4.0 Strategy. The digital capabilities of ICS can be enhanced through implementation of the following strategic goals:

1. ICT Platform upgrade
2. Data Governance implementation
3. Single Digital Identity across Systems (SSO)
4. Centralised IT Managed Service
5. Quick win Implementation
6. Centralised Asset Management System (AMS)
7. Uniformed Customer Experience
8. Enable Modern Learning Platform: ATAW
9. Borderless IT Access
10. Cloud Computing orientation
11. Customer Relationship Management (CRM) for All
12. Digital Campus/Paperless University Setup
13. Reimagine Operations
14. Smart Class Room Setup
15. Innovation Lab Setup

The primary goal of ICS is to focus on the interplay of people, processes, and technologies delivering IT strategic and operational benefits to the University.

To support the ICT 4.0 Strategy, ICS has embarked on an Infrastructure and Systems implementation modernisation initiative to ensure that the University of Johannesburg is equipped to handle the Fourth Industrial Revolution (4IR) requirements and to address and mitigate some of the maintenance backlog risks identified.

Network and Wi-Fi Infrastructure Implementation

The following initiatives are being undertaken by the ICS Department to increase network capacity and the general performance of the Wi-Fi and coverage within the University Campuses.

Fibre Network backbone

The UJ fibre backbone has aged and reached the end of its life. Since the current fibre installation was largely based on old technology, it is unable to cater for high bandwidth requirements. Network devices rely on the fibre network for faster and reliable connectivity. The APK fibre infrastructure was addressed in 2017/2018. A DHET funded project is currently underway at APB to address the requirements and was initiated in 2018. Due to budget restrictions SWC and DFC will be addressed in certain key areas in 2019.

Network Management

The university network has aged and reached its capacity due to high network capacity demands, and high content applications and videos used by students, staff and university visitors. The network also carries high definition CCTV camera video traffic and access control data for Protection Services. We need to upgrade the network devices to enable them to meet these increasing demands. Another critical aspect for 4IR success is network reliability and availability. To achieve this, ICS needs a network with multiple paths, referred to as redundancy. Most parts of the UJ network does not have built-in redundancy. This redundancy is being handled through the upgrade of the Datacentre infrastructure at APK, which will address some of these challenges.

Wi-Fi

All the university's lecture venues, student centres, student day houses, student residences and libraries across all four campuses have Wi-Fi coverage. Wi-Fi coverage also extends to university student residences outside the campuses and other university-owned properties. There are, however, challenges of dark spots in certain places where coverage is not adequate. There is also limited Wi-Fi coverage in staff offices, outside sitting areas, passages, bus stops, and parking spaces. Most of the Wi-Fi infrastructure/devices have reached end of life.

Large classrooms also face challenges due to inadequate technology and network capacity. We need to invest in the replacement of old infrastructure, in coverage expansion and high capacity to be 4IR ready. ICS has identified a few projects to fulfil these requirements.

Network Security and Internet Services

To provide secure internet services without placing the university's production systems and user devices at high cyber-security risk, ICS has implemented next-generation firewall devices with threat management systems. These systems are able to identify and stop some of the advanced threats.

To further enhance the network security capability of the university in the 4IR age, ICS plans to invest in high technology capabilities of its perimeter infrastructure. Although much investment has been made to secure the perimeter, we still have exposure from internal threats. As a result, the ICS division will, during the 2019 financial year, procure and install a next-generation firewall for protection against internal threats pending approval of budget submitted.

APB and DFC Data Centre Rebuild

ICS operates five Data Centres across four campuses. The two APK and one SWC Data Centres were re-modernised in 2010 with energy efficient DC equipment and design. The APB and DFC Data Centres were never rebuilt to take advantage of newer technologies and have not been fire-rated. Rebuilding the two Data Centres to be energy efficient as well as fire-rated will result in a more reliable hosting environment as well as long term energy savings. This talks directly to the ICT Green strategy that supports the University of Johannesburg environmental objectives.

Audio Visual Infrastructure Audit, Automation and Upgrade

Audio Visual Services Blueprint

ICS has initiated a project to upgrade and standardise on technology and solutions in the teaching and learning venues. The aim of this initiative is to document the blueprint of each lecture venue and further develop a “Standards Specification” for the different categories of teaching spaces. One of the key outcomes of this initiative is to develop and document a realistic infrastructure upgrade roadmap and sustainable maintenance of the blueprint.

Audio Visual Automation and Upgrade

As per blueprint, ICS will embark on a project to upgrade UJ’s teaching and learning venues to the standards and recommendations produced by the blueprint. The criticality of the upgrade schedule will be drafted from the infrastructure audit and based on the availability of the funds. An integral part of the project will be to make sure that all audio-visual equipment in all venues will be linked to an automated Software tool to proactively monitor the AV equipment. The tool will also allow Audio Visual technical staff as well as Service Desk staff to administer instant first line support to academic staff experiencing problems during classes.

Data Governance Framework

Handling multiple data sources and providing cross-functional reporting creates issues like data ownership and data conflict, and moreover the governance of information as per regulation. Hence there is a need for the University of Johannesburg to implement a data governance practice to create, maintain and distribute information efficiently and securely

Asset Management

The ICT Asset Management solution will be an end to end ICT Asset Management solution. It will cater for the lifecycle management of all ICT assets from delivery to disposal, and the primary focus should include:

- Full university IT asset inventory (hardware and software)
- Consolidation of Total Cost of Ownership for all IT assets

- Identification of associated software to each IT hardware per department per individual staff member
- Asset tracking
- Tracking usage of the software and compliance
- Licensing types of each software
- Lifecycle management inventory for all IT assets

Customer Relationship Management (CRM)

CRM is a strategy for managing the organisation's relationships and interactions with customers or potential customers. This may be perceived as a tool to manage the relationships with staff and students within the university and also the relationships with prospective students for the university. CRM will particularly assist UJ to stay connected to customers, streamline processes and improve productivity and efficiency in our day-to-day work, determine how we are performing and make informed decisions**.**

CRM is not just a tool, it is a model for improving business relationships with the aid of a tool.
Key benefits of CRM include:

- Enhanced client relationships
- Management of customer contact information
- Management of customer service requests
- Cross-team collaboration or integration of interdepartmental processes
- Improved efficiency of servicing clients

Oracle E-Business Suite Upgrade

UJ uses Oracle E-Business Suite System for the day-to-day business operational needs for human resource management, payroll, financials, procurement, and inventory. The current version of EBS is 12.1.3 which is going to be outdated by 2021. The last major upgrade was done in 2013, and Oracle has since released a number of new versions.

Cyber Security Strategy

The University of Johannesburg needs a robust Cyber-security Strategy with supporting methodologies to generate a comprehensive, highly actionable, and measurable security strategy and roadmap that are in alignment with and support UJ’s strategies and plans. This initiative includes the procurement of pro-active tools required to protect the university against cyber-attacks, spam, phishing, malware distributions, and botnets. It is important for the University of Johannesburg to implement a four sphere cyber-security plan that touches on cyber-security policies, processes, technologies, and resources to ensure that the university is secure and threats are actively managed.

CONCLUSION

Technology is forever changing, and its implementation and management requires a balancing act, whereby the University can continue to be operational while innovation soars to the highest desired levels. This in turn brings other threats to the University.

During 2018 security breaches have continued to be headlined in the news. The impact on the University's brand value and its organisational reputation can be devastating, following a breach. Malicious elements will continue with their nefarious ways in 2019, and ICS should be prepared and respond accordingly to these threats.

ICS should gear up to complete its transformation from a cost centre into a business enabler. Central to digital transformation, ICS can serve as a creator of and key collaborator in new products, services, business models and ways of thinking within the University of Johannesburg.