University Of South Africa

ICT

Business Analysis

Unisa Smart Campus Project

Business Requirements Specification (BRS)

Version 1.2

DOCUMENT INFORMATION AND APPROVALS

VERSION HISTORY

Version #	Date	Revised By	Reason for change
Draft	21 April 2019	TK Mathebula	Initial Draft
V 0.1	07 August 2019	Marrian, Andre	Initial draft
V 0.1	07 August 2019	Sibeko, Feresane	Initial draft
V 0.1	27 August 2020	Dr. Socikwa, Marcia	Included Hot desk requirements
V 0.1	18 September 2020	Bezuidenhout, Martin and Mahomed, Yaseen Van Zyl, Bernard; Khethani, Makonde	Rewritten and prioritized Protection Service (Safety and Security) requirements.
V 0.1	06 October 2020	Du Toit, Koos	Changed terminology
V 1.2	12 October 2020	TK Mathebula	Updated with information as received from different business Units.

DOCUMENT APPROVALS

Approver Name	Project Role	Signature/Electronic Approval	Date
Dr. L Ntswane (University Estate)	Project Board: Chairperson		28/10/2020
MR M Bezuidenhout (Protection Services)	Project Board: Super User		26 October 20202
Mr A Marrian (SBL)	Project Board: Super User		27 October 2020

Unisa logo

Functional Requirements Document
Authorization Memorandum

I have carefully assessed the Business Requirements Specifications (BRS) Document for the (System Name).

MANAGEMENT CERTIFICATION - Please check the appropriate statement.

_____ The document is accepted.

_____ The document is accepted pending the changes noted.

_____ The document is not accepted.

We fully accept the changes as needed improvements and authorize initiation of work to proceed. Based on our authority and judgment, the continued operation of this system is authorized.

NAME Project Leader	DATE
NAME Operations Division Director	DATE
NAME Program Area/Sponsor Representative	DATE
NAME Program Area/Sponsor Director	DATE

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

1.1 Project Overview

UNISA aim to set up a Smart Campus through a series of interconnected devices to facilitate intelligent management and maintenance of its facilities.

The objective of the envisaged project is to develop and implement a Smart Campus Solution that assist Unisa with the best:

- Sustainable & Energy Efficient Campus
- Safe & Secure Learning Environment
- Enhanced Parking Efficiency
- Energy Efficiency
- Campus Security
- Clean & Green Campus
- Resident & Visitor Experience
- Ease of Mobility

The purpose of this specification document is the documentation of high-level requirements for the Unisa Smart Campus Project.

In scope

This document addresses the high-level requirements related to the Unisa Smart Campus Project, with a focus of improving efficiency of institutional operations, services and competitiveness. In addition, to facilitate and transform learning and collaborative learning, and leverage generated data enabling the institution to have a full view all its activities, which will include:

- **Thrive for Sustainable Facilities**
  Drive environmental sustainability, save energy and reduce operational costs

- **Improve Safety and security**
  Early detection of issues to alert the campus community: For example, protest action, facial   recognition, and access control.

- **Provide Efficient Parking Solution**
  Monitoring and effective usage of the university's parking spaces.

- **Move towards Best in Class Student & Faculty Experience**
  Assist the students, staff members and visitors to get access to campus services and help reserve space for meetings.

- **Venue Booking Management**

Out of Scope
- To be determined

2. PRODUCT/SERVICE DESCRIPTION

2.1 Product Context

The *Unisa Strategic Plan 2016-2030* acknowledges that technological advances have implications for an ODL or ODeL institution in terms of taking advantage of new information technology and communication services platforms. It challenges the university to utilise these for greater efficiency, transparency and effectiveness in its responses and services.

This project supports Unisa Strategy 2016-2030 and in particular Strategic Focus 12.

Strategic focus 12 reads as follows:

Unisa steers towards the development of a reliable, robust, and effective ICT infrastructure that enables the innovative use of technology in support of its identified areas of priority, it is cognisant of concerns raised by the academic and support staff, and the student body. The acknowledgement of these stakeholders is important because it enables the university to provide services that are relevant to the stakeholders' needs. Unisa is highly conscious that this strategic focus area should be approached with due care and decisions must be informed by the prevailing realities.

The issues of concern that must be considered and addressed as Unisa charts its technology journey are:
- Affordability of ICT devices
- Capacities and capabilities of use
- Challenges with access to ICT devices
- Sustainable and affordable connectivity
- Energy issues
- Sporadic access

Currently the University functions in a non-cohesive manner, which leads to duplication an inefficient use of resource resulting in inadequate operational performance.
- Inefficient energy management
- Inefficient facilities management
- Infective Security
- Ineffective Space management
- Dulcification of resource

The University needs an integrated solution that will enable end-to-end capabilities in managing the institutions facilities, assets and security. The Smart Campus solution is seen as a concept to resolve and sustain a high performing environment.

2.2 User Characteristics

The implementation of Smart Campus Project will bring about Improved operational efficiencies and effectiveness, cost reduction, Proactive response to changes, Green facilities and save energy and better space utilization.

2.3 Assumptions

The following assumptions apply to the Smart Campus Project. As project planning begins and more assumptions are identified, they will be added accordingly.

- All staff and employees will be trained accordingly in their respective data entry, operations and reporting tasks on the new system
- Funding is available to execute the project successfully
- All department heads will provide necessary support for successful project completion
- Project has executive-level support and backing
- The project will be conducted in English and all documentation produced for the project will be in English.
- The project location will be at Unisa premises in Pretoria. In extenuating circumstances online meetings will be conducted.
- The business might need to change existing business processes to adopt the standard business flows and standard product features and functionality.
- Any issues of management or contractual differences, which cannot be resolved by the project team, will be resolved by the Unisa Project Executive and Business Owners, through the Project Board.

2.4 Constraints

The following constraints apply to the Smart Campus Project. As project planning begins and more constraints are identified, they will be added accordingly.

- There are limited ICT resources available to support the Smart Campus Project simultaneously with other, ongoing, ICT initiatives.
- There are no dedicated business resources to this project. This will have to be addressed early in the project with line managers of identified resource personnel for them to be released into the project for its duration.
- The residual risk is that if the resource personnel are not available it may delay the project.

2.5 Dependencies

To be determined

3. REQUIREMENTS

3.1 SMART CAMPUS FUNCTIONAL REQUIREMENTS

3.1.2 Equipment Management capabilities

Req#	Requirement	Comments	Date Rvwd
SC_1	The system must have ability of Fault Detection & Diagnosis	Fault detection and diagnostics techniques can be used to monitor building systems and to detect and diagnose irregularities and faults.	
SC_2	It must be capable of predictive Maintenance.	Minimize the number of unexpected breakdowns and maximizing asset uptime which improves asset reliability	
SC_3	It must be capable of Monitoring & Control of devices		
SC_4	It must be capable of Equipment Lifecycle Management	The system must manage the usage and maintenance of assets throughout its lifecycle or period of ownership	
SC_5	Building Automation	The System must be intelligent for both hardware and software, integrating heating, venting and air conditioning system (HVAC), lighting, security, and other systems to communicate on a single platform	

3.1.4 Basic Services Management capabilities

Req#	Requirement	Comments	Date Rvwd
SC_6	The system must able to manage Energy.	The energy usage of generators, Solar power management and UPS	
SC_7	The system must be able to perform Predictive Energy	The system must be energy intelligent, marking power grids smart with energy.	

| SC_8 | The system must be able to do Water Management. | Optimum use of water resources
• Grey water recycling (reservoir)
• Pond management
• Reusable water
• Stream management
• ted on/off tap/urinals/toilets
• Water measuring | |
| SC_9 | Smart Campus must be able to do Waste Management. | Managing waste from its inception to its final disposal. | |

3.1.5 Safety & Security Capabilities

Req#	Requirement	Comments	Date Rvwd
SC_10	Upgrade of Impro to Impro Portal	Is crucial to prevent the imminent failure of the access control system.	
SC_11	SEOS Card Encryption	With the Access Control functionality, the newest SEOS card encryption standard must be applied. This will also enable the use of smart phones as "access card".	
SC_12	Database Integration	Integration of data with Student, Oracle HR and other potential databases via Middleware.	
SC_13	Facial recognition technology	Facial recognition is the process of identifying or verifying the identity of a person using their face. It captures, analyses, and compares patterns based on the person's facial details. This can be used at all access-controlled environments. This will also eliminate human contact on the biometric access control technology.	
SC_14	Person facial recognition Based Access:	Authorized individuals are granted access in seconds at campus entrances and exits, generating an alarm when any unauthorized entry is detected, effectively preventing security breaches	

SC_16	RFID on ICT assets	RFID tracking of all ICT assets, and specifically laptops, and other valuable assets.	
	Priority 1		
SC_17	Surveillance Head-End	The current surveillance head-end or recording equipment has reached end-of-life and requires immediate replacement.	
SC_18	Video Management System (VMS)	Current video management system has a licensing and software maintenance model with exorbitant costs. Must be replaced with the Head-End equipment replacement.	
SC_19	Legacy analogue cameras	On the Muckleneuk campus must be replaced with High Definition (HD) IP camera technology. Standard Definition cameras, in critical or high-risk areas, must be replaced with HD IP camera technology. License plate recognition (LPR) cameras on the vehicle lanes must be replaced with specialised LPR cameras, with supporting video management software searches on license plate numbers.	
SC_20	Surveillance with high definition (Megapixel) CCTV	Lots of activities and events happen on a large and open campus. We have, however, relied on limited security personnel. It is difficult to monitor, prevent and report on-campus vandalism, unauthorized intrusions, bullying, and other incidents not seen by security, the new analytics of the CCTV will be able to detect all the different dangers and raise an alarm.	
SC_21	Smart Imaging System	High-resolution images should be integral to a Smart Campus Solution, as the images allow the system to automatically perform recognition, search, and comparison. Traditional CCTV systems have limitations, such as image quality, image storage capacity, and inadequate security for stored information. Therefore, an upgrade to our current CCTV systems is crucial.	
SC_22	Appearance Searching	Appearance searching with artificial intelligent (AI) surveillance searches of	

		clothing colours and many other features.	
SC_23	Self-Learning Video Analytics	The surveillance system will self-analyse a camera image and create alarms on any unusual activity, bringing the image to the foreground in the Control Room environment	
SC_24	License plate recognition (LPR)	system should be in place at the main vehicle entrances and exits. HD IP cameras will record movement on the campus. The system will perform an analysis of the recordings and images as required. The system can recognize unauthorized vehicles, as well as to conduct analyses on suspicious vehicles, items, and people. Alerts are sent out to prevent potentially dangerous situations. All by the built-in analytics of the CCTV system.	
SC_25	Integrated Fever Screening and Mask Detection	This has almost become the norm in features included in the latest PSIM and VMS systems	
SC_26	The high return rate of stolen goods	Access records and smart facial imaging recognition are integrated into a CCTV database and linked to the access management system. The system can then track specific time, location, and whereabouts on campus. Footage helps the security team identify and retrieve lost items.	
SC_27	Situational Awareness	Automatically adapts to varying levels of light and changing weather conditions, providing 24/7 High Definition (HD) video coverage for key areas	
SC_28	Intelligent video analytics	Solutions like Siemens Site IQ can help automate video analysis recognizing objects like vehicles or persons entering policy zones or crossing virtual fences allowing surveillance to focus on potentially important events.	
SC_29	Visitor Enrolment	• Integrated Visitor Enrolment • Portable Visitor Enrolment Devices Real-Time Enrolment and control of Visitors is a challenge for the university	

		• Pre-Booking of Visitors – Visitors System must have the functionality of pre-booking visitors, with OTP's sent to their mobile numbers	
SC_30	Exam Student Verification	This should be one of the top requirements to prevent exam fraud and protect the reputation of the university and integrity of our qualifications.	
SC_31	Individual Monitoring	When a suspicious individual enters a campus, the system generates an alarm in real time and can produce tracking information based on the individual's activities, effectively improving campus security management.	
	Priority 2		
SC_32	Smart ID cards/smart payments	Open closed-loop student ID payment systems to integrate with credit and debit cards, and mobile payments. Integrate Smart ID cards with student information systems to automate and digitize attendance, voting, bursary distributions and even access to residence halls and school facilities.	
SC_33	Time and Attendance	Time and Attendance (T&A) system under HR for the management and reporting of staff attendance and movements.	
SC_34	Smart parking solution CCTV	With booms placed at each parking entrance linked to an analytic counting feature on the CCTV systems, also linked to access control as well, cars in & out will control the parking area hence the boom automatically allowing vehicles to enter parking areas if parking is available.	
SC_35	Systems Integration	Integration with Electric Fence, Intruder Alarms and other peripheral systems.	
SC_36	Web-based & mobile based applications	To allow students to download an application and without any waiting in queues to collect or wait for a student card this can be done online by the already registered student. Possibly also allowing virtual student cards.	
SC_37	Integrated Body-Worn surveillance cameras	Body-Worn cameras with possible live feed to the Control Room via WiFi or GSM.	

SC_38	Mass Notification Systems	A mass notification system (Public Address) can improve safety and security of single buildings or a whole campus by providing alerts and real-time instruction to students, employees and the public during a crisis.	
SC_39	Parking Monitoring	Solution for monitoring very large areas and detecting suspicious targets, even in dim light conditions. Indicators manage and display the availability of public parking spaces.	
SC_40	Physical Security Information Management (PSIM)	PSIM systems integrate fire safety, access control, intrusion detection and video surveillance allowing for information exchange between systems and display and management in a control room environment.	
SC_41	Drones	Already widely used in the security industry, can be applied for security guard tours as they are capable of patrolling more rapidly and extensively than human guards, as well as being unimpeded by physical barriers on the ground.	
	Priority 3		

3.1.6 Space Utilisation Capabilities

Req#	Requirement	Comments	Date Rvwd
SC_42	The System must be capable of Office Hotelling.	Proximity room booking.	
SC_43	Ability to hot desking	▪ Allow employees to book their spaces or any desks that are available on campus. ▪ Workspot suggestions, based on your profile and to make optimal use of the building	
SC_44	The system must be able to do Space Utilization Analysis	Analysis how the space is being used. **Analytics** ▪ Occupancy Heat Maps ▪ Risk areas ▪ Statistics	

Req#	Requirement	Comments	Date Rvwd
		Optimization ▪ Space occupancy ▪ Flow of people **Facility Management** ▪ Dashboard ▪ Logistics ▪ Occupancy ▪ Usage	
SC_45	It must be capable of Vehicle Parking.	**In the Parking** ▪ Navigate to nearest available lot ▪ Signal available lots ▪ Arrival Notification to merchant/organizer **Managing** ▪ Real-time Occupancy ▪ Billing ▪ Statistics ▪ Security ▪ Remote control and opening	

3.1.7 Physical Workplace Services capabilities

Req#	Requirement	Comments	Date Rvwd
SC_46	Physical Document Services	Storage and digital Imaging	
SC_47	Smart Shipping & Receiving	Ability of asset management (Computer RFID and Scanners RFID)	
SC_48	Transportation ability	Vehicle booking Vehicle servicing and licensing.	
SC_49	Smart Catering & Vending	Students receiving allowance can use their smart card on vending marching as well in cafeteria. Purchase from Mobile app Can recycle your plastic drink bottles and aluminum drink cans on the vending machine and get a voucher. You can place the order and pick up food in the restaurant.	
SC_50	Ability of smart Lobby	**Booking**	

		▪ Registration Portal ▪ Directory of Services ▪ Book Services ▪ Payment & Virtual Payment **On Site** ▪ Smart Access integration ▪ Self-check-in with your Phone ▪ Get instant access to services (i.e. WiFi) ▪ Access with your Phone ▪ Pay with your Phone ▪ BOT-based Interaction **Managing** ▪ Bookings ▪ Occupancy ▪ Billing ▪ Statistics **Communicate** ▪ Promote services and products ▪ Notify any modification to schedules and programs	

3.1.8 Digital productivity capabilities

Req#	Requirement	Comments	Date Rvwd
SC_51	Capable of Meeting JumpStart	**Schedule** ▪ Organize meeting ▪ Select room based on features (i.e. projector) ▪ Meeting setup BOT helper based on attendee's availability ▪ Visitors registration **On Site** ▪ Smart Access integration ▪ Smart Lobby integration ▪ Navigate to Meeting room ▪ Secure Access to meeting ▪ Control room appliances from the Phone ▪ Meeting room display to show info, signage and meeting check-in. **Managing** ▪ Occupancy	

		- Usage-based billing - Real-usage statistics - Maintenance requests **Optimization** - Meeting room can be changed based on Accept/Reject - Meeting room are freed if nobody check-in on time - Find free room nearby - Quick room booking	
SC_52	Ability of Conferencing & Telepresence	Be able to teleconference with people who are located at larger distance.	
SC_53	Ability of Place & People Finder	Adapt to people needs in real time to increase productivity and get insights on building usage. Be able to find your colleagues.	
SC_54	Ability of Direction & Navigation	Parking notification based on probability to park – and alternatives. E.g. "You can park at P15 or P17"	
SC_55	Have ambient Intelligence ability.	Adapt to people needs in real time to increase productivity and get insights on building usage.	

Additional requirements

Req#	Requirement	Comments	Date Rvwd
SC_56	Plumbing Management	- Auto blockage detection - Auto Fault detection - Auto leak detection - Request monitoring system - Software integration solution - Integration - Control from feedback - Data center must be stored, analysed. - connect to gateway - Analytics	
SC_57	Cleaning Management	Equipment management	

		- Shift/Leave Management - Work plan management - Daily work plan - Periodic work plan - Carpet & walls - Spring cleaning - Strip and cleaning	
SC_58	Gardening Management	- Equipment management - Staffing - Shift/Leave Management - work plan management - Daily work plan - Garden projects - E-garden - Herb garden - Vegetable garden - Seasonal workplan - Fauna and flora - Rehabilitation/preservation of wetland - Seasonal replacements - Tree trimming	

3.2   System Interface/Integration

3.2.1   Network and Hardware Interfaces

To be determined.

3.2.2   Systems Interfaces

- Integration of the Smart Campus and the following systems, amongst others:
  - Student System, including the Student Management Information System
  - Student Relationship Management (SRM) solution
  - Oracle HR database (and the Oracle ERP at large)
  - Archibus System
  - Microsoft Active Directory

4. DEFERRED REQUIREMENTS

Req#	Business Requirement	Status	Comments	Date Rvwd

5. REQUIREMENTS CONFIRMATION/STAKEHOLDER SIGN-OFF

Include documentation of the approval or confirmation of the requirements here. For example:

Meeting Date	Attendees (name and role)	Comments

6. REFERENCE

LTI Response to
UNISA Smart Campu

LTI

Smart Campus
Business Case v1.pd

-Unisa Business case