BIO-MEDICAL ENGINEERING DEPARTMENT

DOW UNIVERSITY OF HEALTH SCIENCES

STRATEGIC PLAN

(2024 – 2027)

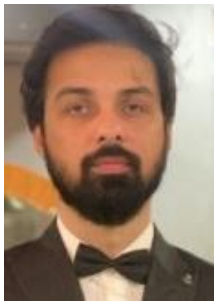
Pioneering Excellence | Inspiring Innovation

To Heal | To Educate | To Discover


بسم الله الرحمن الرحيم

TABLE OF CONTENTS

INCHARGE'S MESSAGE



Looking ahead to 2030, our vision for the DUHS Biomedical Engineering Department is to revolutionize patient care with cutting-edge technology, foster innovation and collaboration, and establish DUHS as the most innovative institute for patient care through technology and expertise.

Dr. Osama A Qayoom

EXECUTIVE SUMMARY

The Biomedical Engineering Department at DUHS is committed to transforming healthcare delivery through innovative medical technology solutions, exceptional service, and strategic partnerships. Our strategic plan is built on three core foundations.

Enhance Patient Care

We aim to enhance patient care by implementing cutting-edge medical technologies to improve patient outcomes, developing and integrating smart healthcare solutions for an enhanced patient experience, and collaborating with clinicians to design and implement patient-centered solutions.

Foster Innovation and Collaboration

To drive innovation and excellence, we will establish partnerships with industry leaders, academia, and research institutions, encourage interdisciplinary research and development, and develop and participate in training programs to enhance staff skills and knowledge.

Operational Excellence

Operational excellence is also a key priority. We will optimize departmental processes for efficiency, effectiveness, and compliance, develop and retain a skilled, diverse, and customer-focused workforce, and implement robust quality management systems to ensure continuous improvement.

Our goal is to establish the Biomedical Engineering Department at DUHS as a leader in innovative healthcare solutions, driving excellence in patient care, research, and education.

INTRODUCTION & OVERVIEW

Biomedical Engineering Department: Achievements Over the Last Five Years

Over the past three years, the Biomedical Engineering Department at DUHS and its outreach campuses have made significant strides in improving the management, maintenance, and operation of medical equipment. These efforts have led to enhanced operational efficiency, compliance with local standards, and increased reliability and performance of the department's equipment. Below are some of the key achievements:

1. Comprehensive Equipment Record Maintenance

Historically, maintaining an organized and accessible record of biomedical equipment was a challenge due to the broad footprint of equipment across DUHS and its outreach campuses. In the past, equipment records were either incomplete or disorganized, making it difficult to track the status, maintenance, and history of each piece of equipment.

In the past five years, the department has made great strides in addressing this issue by implementing a robust and systematic approach to equipment record maintenance. Each and every piece of biomedical equipment across all DUHS facilities and outreach campuses is now cataloged and tracked.

This transformation has enabled the department to effectively track the lifecycle of each piece of equipment, minimize downtime, and ensure that equipment is operating at optimal performance levels.

2. Overcoming Resource Constraints and Expanding Coverage

Maintaining accurate records and managing a broad array of biomedical equipment across multiple campuses presented significant challenges, particularly given limited resources in the past. However, despite these constraints, the department took proactive steps to streamline operations and ensure comprehensive coverage.

With a focus on efficiency and resource optimization, the department has successfully established a process to manage both the existing and newly added biomedical equipment across DUHS's facilities. This includes leveraging technology to facilitate the tracking of equipment movements, maintenance schedules, and upcoming upgrades or replacements.

3. Effective Management of New Projects and Facility Additions

In addition to the routine maintenance and management of existing equipment, the department has successfully managed several new projects and the integration of additional facilities. This included:

- Coordinating the procurement and installation of new biomedical equipment for expansion projects across DUHS and its outreach campuses.
- Overseeing the timely integration of new medical technologies into the clinical setting, ensuring minimal disruption to patient care and operational workflows.
- Leading the design and implementation of specialized equipment for newly established departments or services.

The department's ability to manage these projects efficiently has helped ensure that DUHS continues to offer cutting-edge medical care while maintaining the highest standards of patient safety and equipment reliability.

4. Streamlining Preventive Planned Maintenance (PPM)

A major milestone for the Biomedical Engineering Department has been the comprehensive overhaul of the Preventive Planned Maintenance (PPM) program. The department has worked diligently to align its PPM processes with internationally recognized guidelines and standards, as well as the specific recommendations from Original Equipment Manufacturers (OEMs) and approved manufacturer checklists.

This initiative involved a multi-step approach:

- **Adopting International Standards:** The department adopted internationally recognized maintenance practices and guidelines, which provided a structured approach to PPM. This not only ensured the optimal functioning of the equipment but also helped improve patient safety by reducing the likelihood of equipment failure.
- **OEM Guidelines Compliance:** The department worked closely with manufacturers and suppliers to align its maintenance procedures with their specific guidelines. This collaboration led to the development of standardized maintenance checklists, which improved the accuracy and consistency of PPM activities.
- **Training and Awareness Programs:** Initially, many of the suppliers and vendors were reluctant to adopt these stringent PPM guidelines. However, through rigorous communication, training, and continuous follow-up, the department successfully ensured full compliance. The training programs aimed at both internal staff and external vendors helped enhance understanding of the guidelines and their importance in ensuring equipment reliability.
- **Achieving Optimal PPM Compliance:** Through persistent effort and commitment, the department has achieved near-complete adherence to

the approved PPM schedules, with most equipment now being maintained according to manufacturer guidelines. This has resulted in improved equipment uptime and performance, as well as better outcomes in terms of reducing repair costs and preventing unplanned downtime.

5. Strengthening Vendor Relationships and Compliance

Initially, suppliers and vendors showed reluctance in adhering to the rigorous PPM standards set forth by the department. However, the Biomedical Engineering Department took a proactive stance to bridge the gap between the department's needs and the vendors' operational processes. Through consistent communication and negotiation, the department emphasized the importance of strict adherence to PPM schedules and international best practices.

As a result of this focused effort, the department has successfully built stronger relationships with its vendors and suppliers. This collaboration has ensured that all biomedical equipment is serviced according to the highest standards, which has translated into:

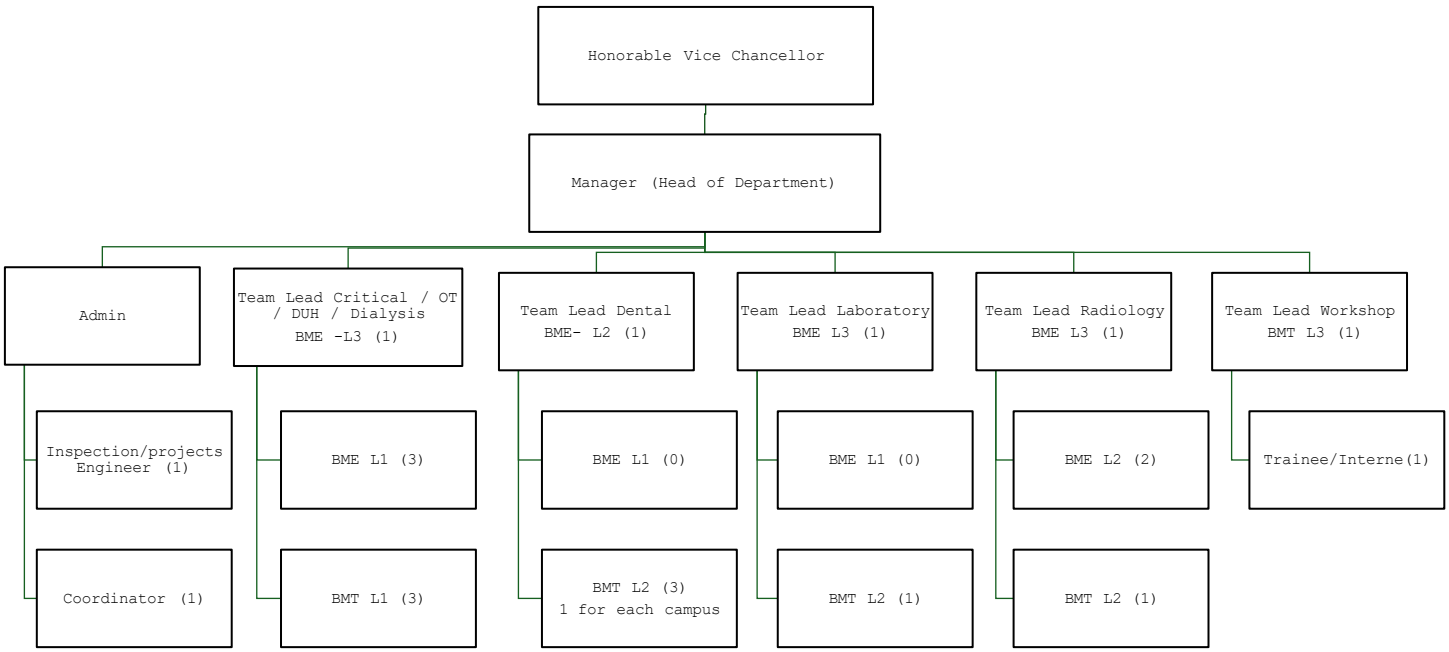
- Reduced breakdowns and equipment failures
- Higher levels of trust and accountability with vendors
- Improved vendor performance, leading to quicker response times and higher quality service
- Enhanced patient care through well-maintained, reliable equipment

Key Highlights and Achievements:

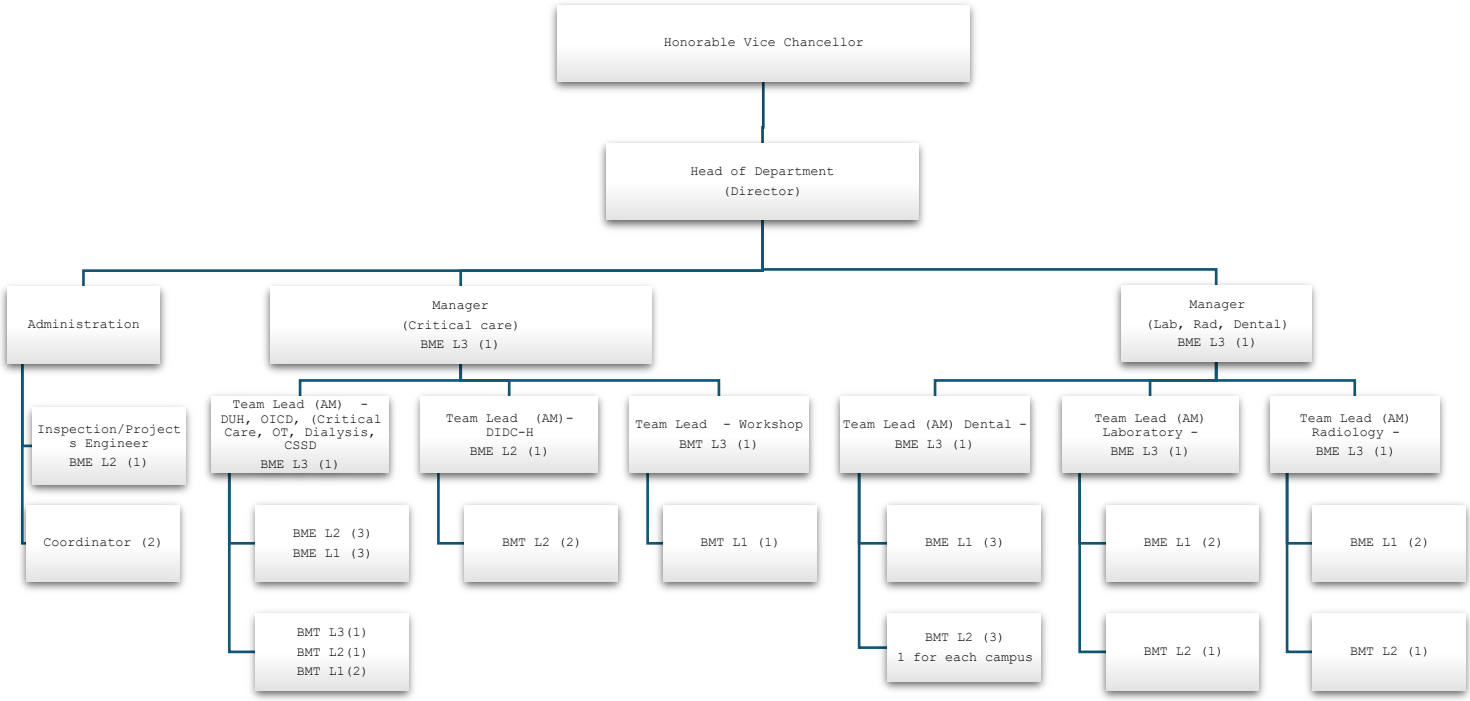
Impactful Milestones	Year
• Eye OT expansion and upgrade • Restructuring of BMED departmental teams • Covid Wards & HDUs • ER Trauma	2021
• Central in-house workshop • Training on Equipment with underutilised features – (Ex. Biopsy module of Hologic Mammography, installed in 2018) • Enhancement of CSSD capacity by centralization of Autoclave from Gynae OT to OT Complex • Shifting of CT from Malir Chest Clinic (MCC) to OJHA Trauma centre and increasing the capacity of the existing room to accommodate future expansion of another CT • Assisted in RBC Shifting to DUHS • Medical Equipment tagging • Comprehensive Equipment Maintenance Record • Revamping of Medical, Surgical & Lever transplant ICU	2022
• Expansion and upgrade of Ultrasounds OPD at DIR • Assisted DUH in all requirements to attain CPSP approval for , Nephrology, Urology, Haematology & BMT, General Paediatric, Microbiology, Liver Transplant, Hepatobiliary, Interventional Cardiology, Surgical Oncology, Neuro-Oncology, Trauma Surgery Ground floor, • Assisted DIKOHS in attaining SHCC license • Streamlined Preventive Planned Maintenance (PPM) by using standardized checklists to ensure manufacturer's recommendations • Duplexed RO Plant to ensure 100% availability of RO water • Assisted in establishment of HDU 1, HASU, and GI HDU	2023
• Biplane Angiography • CT site at LEJ was upgraded to accommodate Cardiac and Advanced CT • Assisted DUH in all requirements to attain SHCC preliminary license • Upgraded Anesthesia, C-ARM and several other equipment in OT • Addition of New Women Imaging wing with advanced Mammography • Assisted in Establishment of Body plethysmography and upgrade of Sleep Lab • New Digital X-Ray at OPD, OICD and MCC • Assisted In Establishment of PICU • OSL for all radiation staff • DIDCH- OT, CSSD, Dental OPD, X-Ray, CBCT • Upgraded Fibroscan, drying cabinets, washing area and Endoscope towers at NILGID • Gamma Camera installation in Comprehensive Care center • Reduction in Annual maintenance contract prices from 11% to 7.5% and newer contract on 7%	2024

ORGANOGRAM

Current Organizational Chart of the Biomedical Engineering Department of DUHS



Proposed Organizational Chart of the Biomedical Engineering Department of DUHS



SECTION I: OVERVIEW OF THE STRATEGIC PLANNING PROCESS

The strategic planning process for the Biomedical Engineering Department at DUHS was designed to be inclusive, data-driven, and forward-looking. It involved multiple stages of internal assessment, stakeholder engagement, and benchmarking against best practices in biomedical engineering and healthcare technology management.

The planning process was initiated by conducting a comprehensive situational analysis, which included a review of past achievements, current operational performance, and emerging trends in medical technology. This was followed by structured consultations with key internal and external stakeholders. Their insights were critical in identifying departmental strengths, areas for improvement, and future opportunities.

The strategic goals were defined based on the department's mission to enhance patient care, foster innovation, and achieve operational excellence. Each goal was mapped with clear, time-bound objectives to ensure measurable progress and accountability.

The planning process also prioritized alignment with national healthcare standards and DUHS's overarching institutional vision, ensuring that the Biomedical Engineering Department remains at the forefront of healthcare innovation, quality, and sustainability.

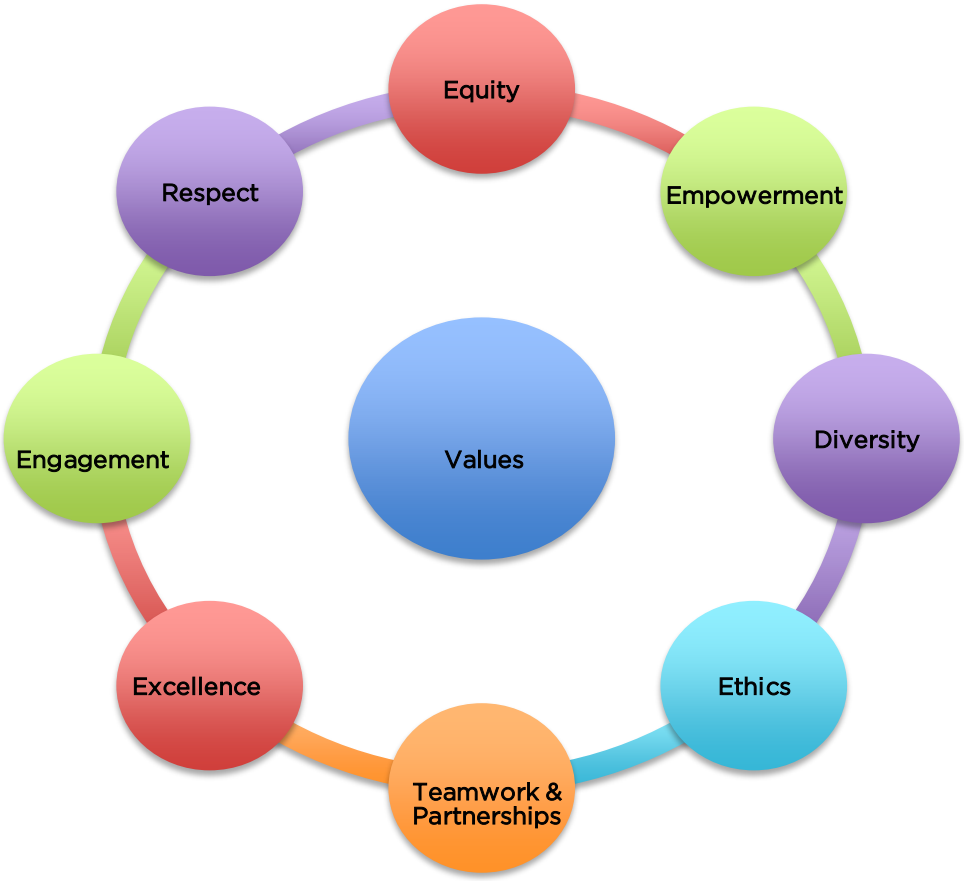
SECTION II: VISION, MISSION & VALUES

VISION

To be a pre-eminent academic institution committed to changing and saving lives.

MISSION

Providing outstanding patient-centered education, training, and clinical care informed by cutting-edge research and innovation generating and disseminating new knowledge.



VALUES

- Customer Service
  - Put students first
- Empathy & Compassion
  - Understand before you judge
  - Be concerned for the sufferings and misfortunes of others

- Excellence
    - Be the best and commit to exceptional quality and service
- Innovation
    - Encourage curiosity, imagine, create, and share
- Teamwork
    - Engage and collaborate
- Integrity & Leadership
    - Be a role model and influence others to achieve their best
    - Have the courage to do the right thing
    - Hold yourself and others accountable
- Respect & Collegiality
    - Be kind
    - Listen to understand
    - Value different opinions

STATEMENT OF PURPOSE

To ensure safe, innovative and effective use of medical equipment and devices in patient care.

SECTION III: ASPIRATIONAL INSTITUTIONS

1. Agha Khan University Hospital (AKU), Karachi

2. Shifa International Hospital (SIH), Islamabad

Strategic Benefits for DUHS Biomedical Engineering Department

1. **Optimization of Equipment Maintenance Standards:**
    - By adopting best practices from JCI-accredited institutions like AKU and SIH, DUHS can ensure that its **repair and maintenance** procedures are aligned with international safety and quality standards. This will improve the effectiveness, safety, and longevity of the equipment managed by the department.
2. **Enhancing Repair Efficiency and Minimizing Downtime:**
    - Drawing from the preventive maintenance and emergency repair protocols used at AKU and SIH, DUHS can enhance its own repair efficiency. This will lead to reduced equipment downtime, ensuring that critical medical devices are always available and fully operational when needed.
3. **Training and Professional Development for Biomedical Engineers**
    - Training and continuous learning are key components of high-quality repair and maintenance operations. By partnering with institutions like AKU and SIH, DUHS can provide its biomedical engineers with exposure to the latest trends, tools, and methodologies in equipment maintenance, ensuring their professional development and skill enhancement.
4. **Improved Compliance with Global Equipment Safety Standards:**
    - **JCI accreditation** emphasizes maintaining high standards of safety and quality in all aspects of healthcare. By adopting these standards, DUHS can ensure that its biomedical engineers are equipped with the knowledge and practices needed to maintain medical equipment at the highest level of safety and performance.
5. **Better Workflow and Equipment Lifecycle Management:**
    - The experience of AKU and SIH in managing the **entire lifecycle** of medical equipment—from acquisition to repair and decommissioning—can guide DUHS in improving its own equipment management processes. This includes **tracking, servicing, and maintaining** equipment to ensure its functionality and compliance with healthcare standards.

SCTION IV: STRATEGIC GOALS

Enhance Operational Efficiency Through CMMS

Objective 1: Implement a Computerized Maintenance Management System (CMMS) by the end of Q1 2026 to track equipment maintenance schedules and performance

Objective 2: Train Clinical staff /end users on CMMS usage within three months of implementation such as, Train DUH Staff, Train DIR Staff, Train DDRRL, ARL, DCOP, DCOP, DIMC Staff by end of Q2 2026.

Objective 3: Enhance and improve equipment uptime by 92% within one year through data-driven maintenance strategies enabled by CMMS by end of Q4 2026.

Goal 2: Foster Continuous Professional Development

Objective 1: Identify the top 10 critical Potential Equipment Manufacturers by the end of Q1 2025.

Objective 2: Develop and establish a manufacturer-led Certified Training Programs by the end of Q2 2025.

Objective 3: Conduct in-house at least level 1 Training Session by the end of Q3 2025.

Objective 4: Conduct post-training assessment to identify training gaps by the end of Q3 2025.

Objective 5: Annual Equipment User Training for all staff by the end of Q3 2025.

Objective 6: Training for Safe handling of equipment to reduce equipment damage by the end of Q3 2025.

Goal 3: Audit and Compliance

Objective 1: Conduct Biannual audit compliance before external inspection of PMDC and SHCC by end of Q2 2026

Objective 2: Conduct Annual Audit of Biomedical Assets Q2 2026.

Objective 3: Effective Incident Reporting with tracking of asset and user by end of Q3 2026.

Goal 4: Patient Safety

Objective 1: Conduct Electrical Safety Test consolidated with annul PPM ICU, OT, HDU, DDRL & DIR by end of Q4 2025.

Goal 5: Supply Chain

Objective 1: Dedicated space in Central warehouse for Medical Equipment, Equipment, spare parts & accessories.

Goal 6: Promote Sustainability and Green Practices

Objective 1: Complete Digital Record Keeping after implementation of CMMS by end of Q2 2026.

Goal 7: Adopt Remote Monitoring and Diagnostics for Equipment

Objective 1: Implement remote monitoring systems for biomedical equipment by end of Q4 2026.

OBJECTIVES, OKRs & KPIs

Goal 01:Enhance Operational Efficiency Through CMMS					
Goal Statement 01: To track equipment maintenance schedules and performance					
Objective	**Baseline**	**Key Results**	**Resources**	**Person Responsible**	**Timeline**
Implement a Computerized Maintenance Management System (CMMS) by the end of Q4 2025 to track equipment maintenance schedules and performance	Manual System	System Selection and	1M PKR 2xJunior BME	Team Leads/AM	Q2 2025
Goal Statement 01: CMMS Training					
Objective	**Baseline**	**Key Results**	**Resources**	**Person Responsible**	**Timeline**
Train Clinical staff /end users on CMMS usage within three months of implementation	Dow connect	Train DUH Staff	-	Team Leads/AM	Q1 2026
		Train DIR Staff	-	Team Leads/AM	Q1 2026
		Train DDRRL,ARL, DCOP, DCOP, DIMC Staff	-	Team Leads/AM	Q1 2026

Goal Statement 01: Enhance and Improve Equipment Uptime					
Objective	**Baseline**	**Key Results**	**Resources**	**Person Responsible**	**Timeline**
Enhance and improve equipment uptime by 92% within one year through data-driven maintenance strategies enabled by CMMS	90% of major and critical equipment	Uptime Percentage	Proposed Staff Strength in earlier slide	Team Leads/AM	Q2 2026
		PPM on time		Team Leads/AM	Q4 2026
		Reduction in MBTF		Team Leads/AM	Q4 2026

Goal 02:Foster Continuous Professional Development					
Goal Statement 02: Certified Trainings for Biomedical Engineers					
Objective	**Baseline**	**Key Results**	**Resources**	**Person Responsible**	**Timeline**
Identify Potential Equipment Manufacturers	Informal training	Identify top 10 Critical equipment	0.5% of Med Eqpt Procurement cost	Team Leads/AM	End of Q1 2025
Develop Certified Training Programs		Establish a manufacturer-led training program:			End of Q2 2025
Conduct In House Training Sessions		At least Level 1 Training			End of Q3 2025
Conduct Post training assessment		Identification of Training Gaps			End of Q3 2025

Goal Statement 02: Create comprehensive training programs for staff.					
Objective	**Baseline**	**Key Results**	**Resources**	**Person Responsible**	**Timeline**
Equipment User Training	At the time of installation	Annual training plan for all staff	Staff strength as discussed earlier	Team Leads/AM	End of Q3 2025
Safe handling Of equipment	Non-Compliance with equipment handling	Reduce equipment Damage		Team Leads/AM	End of Q3 2025

Goal 03: Audit and Compliance					
Goal Statement 03: Bi Annual and Annual Audits for Qualitative and Quantitative Measures					
Objective	**Baseline**	**Key Results**	**Resources**	**Person Responsible**	**Timeline**
PMDC and SHCC	Before external inspection	Bi annual compliance Audit	Staff strength as discussed earlier	QC, BMED	Q2 2026
Biomedical Assets Audit	None	Annual Audit		QC, Fixed Assets	Q2 2026
Effective Incident Reporting	Emails	Incident report with tracking of asset and user	CMMS	QC, Fixed Assets	Q3 2026

Goal 04: Patient Safety					
Goal Statement 04: Minimize risks to patient health, staff wellbeing, and equipment functionality					
Objective	**Baseline**	**Key Results**	**Resources**	**Person Responsible**	**Timeline**
Electrical Safety Test (ICU, OT and HDU)	None (Unavailability of the tools)	Patient, Staff and Equipment Safety	Sufficient staff as discussed above	Team Lead / AM	Consolidation with annual PPM
Electrical Safety Test (DDRRL)		Patient, Staff and Equipment Safety		Team Lead / AM	
Electrical Safety Test (DIR)		Patient, Staff and Equipment Safety		Team Lead / AM	

Goal 05: Supply Chain					
Goal Statement 05: Maintain an efficient supply of equipment and spares to avoid shortages and operational disruptions					
Objective	**Baseline**	**Key Results**	**Resources**	**Person Responsible**	**Timeline**
Warehouse location for Medical Equipment, Equipment, spare parts & accessories.	Trauma, RIVA	Dedicated space in Central warehouse	Supply chain officer	Supply Chain	After Completion of Warehouse

Goal 06: Promote Sustainability and Green Practices					
Goal Statement 06: Incorporate environmentally friendly practices					
Objective	**Baseline**	**Key Results**	**Resources**	**Person Responsible**	**Timeline**
Complete Digital Record Keeping	Manual Record	Paperless & Digital Record	-	Team Leads	Q42026

Goal 07: Adopt Remote Monitoring and Diagnostics for Equipment					
Goal Statement 07: Leverage remote monitoring technologies to improve equipment uptime and operational efficiency.					
Objective	**Baseline**	**Key Results**	**Resources**	**Person Responsible**	**Timeline**
Implement remote monitoring systems for biomedical equipment.	MGPS, Biplane Angio, CT & MR.	Paperless & Digital Record		Team Leads	Q42026

SECTION V: RESOURCE PLANNING FOR ACHIEVING STRATEGIC GOALS

Successful execution of the strategic plan requires careful alignment of resources, both human and material. The Biomedical Engineering Department has developed a resource plan focused on optimizing available assets while identifying areas that require additional support.

1. Human Resources:

- **Workforce Development:** Recruitment of additional biomedical engineers, technicians, and data analysts to support CMMS implementation and expansion projects.
- **Training & Development:** Investment in continuous professional development programs, including manufacturer-certified training and internal capacity-building initiatives.
- **Cross-Departmental Training:** Allocation of training coordinators to implement user training sessions across DUHS and outreach campuses.

2. Technological Resources:

- **CMMS Implementation:** Procurement of a scalable, cloud-based Computerized Maintenance Management System.
- **Remote Monitoring Infrastructure:** Investment in IoT-based remote monitoring tools and diagnostic platforms.
- **Digital Systems:** Enhancement of IT systems to support digital record-keeping, audit trails, and real-time data access.

3. Financial Resources:

- **Budget Allocation:** Dedicated budget lines have been proposed for CMMS acquisition, training programs, preventive maintenance, and new equipment procurement.
- **Vendor Partnerships:** Strategic vendor agreements to include training, extended warranties, and technical support as part of procurement contracts.

4. Physical Resources:

- **Warehouse Space:** Designated secure storage area for spare parts and biomedical accessories in the Central Warehouse.
- **Facility Expansion:** Resource planning for integration of biomedical support in all newly developed healthcare units

SECTION VI: IMPLEMENTATION & MONITORING OF THE STRATEGIC PLAN

A structured implementation framework has been developed to ensure the timely and effective execution of the strategic plan. The framework emphasizes clarity of roles, continuous monitoring, and responsive adaptation.

1. Implementation Roadmap: Each strategic goal is supported by a detailed implementation roadmap outlining key activities, responsible personnel, deadlines, and resource requirements. A phased approach will be adopted to prioritize high-impact initiatives such as CMMS rollout, staff training, and patient safety programs.

2. Governance and Oversight: A Strategic Implementation Committee comprising senior department leadership, project managers, and key stakeholders, will oversee progress, resolve challenges, and ensure cross-functional coordination.

3. Performance Monitoring:

- KPIs and Metrics: Each objective will be tracked using defined Key Performance Indicators (KPIs), such as equipment uptime percentage, PPM compliance rate, training participation, and audit outcomes.
- Quarterly Reviews: Progress reports will be prepared and reviewed quarterly to ensure alignment with the strategic timeline and make course corrections where needed.

4. Risk Management: Potential risks to implementation, including vendor non-compliance, staff turnover, or technology integration delays, will be monitored proactively. Mitigation strategies, such as backup vendor contracts and cross-training programs, will be in place.

5. Continuous Improvement: Regular feedback loops will be established to gather insights from end-users, vendors, and technical teams. Lessons learned will be documented and used to refine practices and enhance future planning cycles.

SECTION VII: LIST OF APPENDICES

No.	DESCRIPTION
A	SWOT Analysis
B	TOWS Matrix

APPENDIX A: SWOT ANALYSIS

STRENGTHS	WEAKNESSES
1. DUHS Legacy: Being part of Dow University of Health Sciences (DUHS), the Biomedical Engineering Department benefits from the university's state-of-the-art facilities, including modern laboratories and advanced imaging diagnostics. This enhances the learning experience in medical equipment management and maintenance. Furthermore, the university's reputation for quality patient care and its esteemed name in the industry lend credibility and strength to our department. 2. Leadership support: The Biomedical Engineering Department receives strong leadership support from DUHS, enabling effective decision-making and strategic planning. This support fosters a collaborative environment, driving innovation and excellence in medical equipment management and maintenance. 3. Collaboration with vendors, Manufacturers: Established partnerships with medical equipment suppliers and manufacturers enhance our department's access to cutting-edge technology and expertise. These collaborations facilitate knowledge sharing, training, and support, ensuring optimal equipment performance and maintenance. 4. Diversified portfolio of equipment: The Biomedical Engineering Department manages a wide range of medical equipment from various manufacturers, showcasing our versatility and adaptability. This diversified portfolio enables us to develop and implement comprehensive maintenance	1. Insufficient Sanctioned strength: The current sanctioned strength of the Biomedical Engineering Department is below industry standards, impacting on our ability to efficiently manage and maintain medical equipment. This shortfall can lead to increased workload, delayed maintenance, and potential equipment downtime. 2. Lack of Specialized/Certified training: The department lacks access to specialized/certified training on medical equipment, hindering adherence to best industry practices and improving efficiency. 3. Equipment Selection Process: The biomedical department's technical expertise is underutilized in equipment selection, potentially causing compatibility issues, maintenance problems, and increased downtime, as well as inadequate vendor support and training. 4. Non-Market competitive salary packages: Current salary packages are below market rates, hindering the attraction and retention of skilled professionals, and negatively impacting employee morale and motivation. 5. Electricity Challenge: Frequent power outages or voltage fluctuations can disrupt biomedical equipment functionality, impacting patient care and department operations. 6. Roof Leakage: Recurring roof leaks pose a risk to medical equipment, staff, and patient safety, and can

strategies, ensuring optimal equipment performance and uptime.	lead to maintenance and repair challenges. 7. Rodent Infestation: The presence of rodents across DUHS facilities, including equipment installation and storage areas, poses a risk of equipment damage, contamination, and compromise of sterilization. 8. Equipment Misuse and Accountability: Insufficient training, lack of standard operating procedures (SOPs), or inadequate accountability measures can lead to equipment misuse, damage, or safety incidents.
OPPORTUNITIES	**THREATS**
1. Implementation of Computerized Maintenance Management System (CMMS): Implementing a Computerized Maintenance Management System (CMMS) will streamline maintenance operations, reduce downtime, and increase equipment availability, while enabling data-driven decision-making and ensuring regulatory compliance. 2. Training & workshops: Regular training and workshops for biomedical engineering staff and users can enhance technical skills, knowledge, and productivity, while improving troubleshooting and familiarizing them with new technologies. 3. Networking collaboration with other engineering departments & institutes: Collaborative research and project opportunities can foster innovation, while internships and training programs can enhance the skills and capacity of young biomedical engineers. 4. Remote monitoring diagnostic of the equipment: Implementing remote monitoring and diagnosis for biomedical equipment will enhance	1. Economic instability: Economic challenges pose significant threats, including reduced budgets, limited investments in technology and equipment, talent attraction and retention difficulties, and increased pressure to optimize operations and reduce costs. 2. Rapid Technological Advancement: Rapidly evolving medical technology poses challenges, including equipment obsolescence, staff training needs, increased upgrade and maintenance costs, and potential operational disruptions, risking being left behind if unable to adapt. 3. Reliance on Imports: Reliance on foreign suppliers for biomedical equipment and spare parts creates vulnerabilities to supply chain disruptions, price fluctuations, and quality control issues, while also raising national security and self-sufficiency concerns.

operational efficiency and patient care by reducing downtime, improving troubleshooting, and increasing equipment availability, ultimately leading to improved patient safety and care quality.	

APPENDIX B: TOWS MATRIX

OPPORTUNITIES	THREATS
1. Implementation of Computerized Maintenance Management System (CMMS): Implementing a Computerized Maintenance Management System (CMMS) will streamline maintenance operations, reduce downtime, and increase equipment availability, while enabling data-driven decision-making and ensuring regulatory compliance. 2. Training & workshops: Regular training and workshops for biomedical engineering staff and users can enhance technical skills, knowledge, and productivity, while improving troubleshooting and familiarizing them with new technologies. 3. Networking collaboration with other engineering departments & institutes: Collaborative research and project opportunities can foster innovation, while internships and training programs can enhance the skills and	1. Economic instability: Economic challenges pose significant threats, including reduced budgets, limited investments in technology and equipment, talent attraction and retention difficulties, and increased pressure to optimize operations and reduce costs. 2. Rapid Technological Advancement: Rapidly evolving medical technology poses challenges, including equipment obsolescence, staff training needs, increased upgrade and maintenance costs, and potential operational disruptions, risking being left behind if unable to adapt. 3. Reliance on Imports: Reliance on foreign suppliers for biomedical equipment and spare parts creates vulnerabilities to supply chain disruptions, price fluctuations, and quality control issues, while also raising national security and self-

	capacity of young biomedical engineers. 4. Remote monitoring diagnostic of the equipment: Implementing remote monitoring and diagnosis for biomedical equipment will enhance operational efficiency and patient care by reducing downtime, improving troubleshooting, and increasing equipment availability, ultimately leading to improved patient safety and care quality.	sufficiency concerns.
STRENGTHS	SO	ST
1. DUHS Legacy: Being part of Dow University of Health Sciences (DUHS), the Biomedical Engineering Department benefits from the university's state-of-the-art facilities, including modern laboratories and advanced imaging diagnostics. This enhances the learning experience in medical equipment management and maintenance. Furthermore, the university's reputation for quality patient care and its esteemed name in the industry lend credibility and strength to our	1. CMMS Implementation: Use the legacy and leadership support from DUHS to streamline operations through CMMS, which improves equipment uptime, reduces maintenance delays, and ensures a more efficient department. 2. Training & Workshops: Take advantage of the existing collaborations with vendors and manufacturers to organize specialized training workshops, ensuring both staff and users have the skills needed for the latest technologies. 3. Networking and Collaboration: Use	1. Negotiating with Suppliers: Use the department's reputation and vendor partnerships to secure favorable deals in the face of economic instability, ensuring the department can access high-quality medical equipment and spare parts without significant cost increases. 2. Staying Ahead Technologically: The strong leadership and support from DUHS, combined with collaborations with equipment suppliers, can help keep the department updated with the

department. 2. Leadership support: The Biomedical Engineering Department receives strong leadership support from DUHS, enabling effective decision-making and strategic planning. This support fosters a collaborative environment, driving innovation and excellence in medical equipment management and maintenance. 3. Collaboration with vendors, Manufacturers: Established partnerships with medical equipment suppliers and manufacturers enhance our department's access to cutting-edge technology and expertise. These collaborations facilitate knowledge sharing, training, and support, ensuring optimal equipment performance and maintenance. 4. Diversified portfolio of equipment: The Biomedical Engineering Department manages a wide range of medical equipment from various manufacturers,	DUHS's reputation and established partnerships to create opportunities for joint research, projects, and internships with other departments or institutions, leading to further innovation in the field. 4. Remote Monitoring: Leverage DUHS's modern infrastructure and manufacturer relationships to implement remote diagnostic and monitoring systems for biomedical equipment, improving efficiency and patient safety.	latest technological advancements and prevent equipment obsolescence. 3. Reducing Dependence on Imports: The department can work with DUHS's leadership and existing vendor partnerships to strengthen local supplier relationships and minimize the risks of reliance on foreign imports.

showcasing our versatility and adaptability. This diversified portfolio enables us to develop and implement comprehensive maintenance strategies, ensuring optimal equipment performance and uptime.		
WEAKNESSES	**WO**	**WT**
1. Insufficient Sanctioned strength: The current sanctioned strength of the Biomedical Engineering Department is below industry standards, impacting on our ability to efficiently manage and maintain medical equipment. This shortfall can lead to increased workload, delayed maintenance, and potential equipment downtime. 2. Lack of Specialized/Certified training: The department lacks access to specialized/certified training on medical equipment, hindering adherence to best industry practices and improving efficiency. 3. Equipment Selection Process: The biomedical department's technical expertise is	1. Sanctioned Strength & Recruitment: Advocate for more resources and recruit skilled professionals by highlighting the department's achievements and growth opportunities through leadership support and collaboration. 2. Specialized Training: Work with partners to provide specialized training or certifications for staff to overcome the lack of certified training in the department. 3. Collaboration to Solve Infrastructure Issues: Network with other departments and institutions to create initiatives that help address infrastructural weaknesses like power outages, roof leaks, and rodent infestations, possibly through shared	1. Infrastructure Funding: Given economic instability and infrastructure issues (e.g., power outages and roof leakage), seek external funding, grants, or university support to make improvements to the physical infrastructure and equipment management. 2. Staff Training for Technological Advancement: Prioritize investment in staff development to address both the challenges of rapid technological advancements and the department's weaknesses in training, thus ensuring long-term resilience against technology obsolescence. 3. Local Sourcing &

underutilized in equipment selection, potentially causing compatibility issues, maintenance problems, and increased downtime, as well as inadequate vendor support and training. 4. Non-Market competitive salary packages: Current salary packages are below market rates, hindering the attraction and retention of skilled professionals, and negatively impacting employee morale and motivation. 5. Electricity Challenge: Frequent power outages or voltage fluctuations can disrupt biomedical equipment functionality, impacting patient care and department operations. 6. Roof Leakage: Recurring roof leaks pose a risk to medical equipment, staff, and patient safety, and can lead to maintenance and repair challenges. 7. Rodent Infestation: The presence of rodents across DUHS facilities, including equipment installation and storage areas, poses a risk of equipment damage,	resources or expertise.	Spare Parts Management: To minimize risks associated with supply chain disruptions and reliance on imports, implement strategies to strengthen local sourcing and improve inventory management for critical parts.

contamination, and compromise of sterilization. 8. Equipment Misuse and Accountability: Insufficient training, lack of standard operating procedures (SOPs), or inadequate accountability measures can lead to equipment misuse, damage, or safety incidents.		