HEALTH TECHNOLOGY MANAGEMENT (HTM)
Model for establishing Biomedical Engineering Centres of Excellence
Medical engineers and technicians are tasked with the crucial role of managing and maintaining equipment at hospitals in order to avoid unnecessary complications. However, a shortage of trained technicians exists in large parts of Sub-Saharan African (SSA) and is compounded by lack of spare parts for medical equipment, as well as poor adherence to effective operational processes and ways of working. It is estimated that in SSA, around 50% of equipment is not functioning or not properly maintained at any given time.

A typical operating theatre at one of Tanzania’s largest hospitals has >20 different types of medical devices, all of which play key roles in ensuring a safe and often life-saving outcome for patients. However, a broken bulb, faulty switch, or inaccurate device display can severely threaten this outcome.

Imagine a surgeon having to perform open-heart surgery without operating lights working.

Whether equipment works or not can mean the difference between a life saved or lost.

Without functioning equipment, doctors are restricted in their ability to provide quality care.
Vision & Objective

Project objective
Raise the hospital’s quality of care provided to patients by addressing operational and management challenges, first by focusing on engineering, then rolling out to the wider hospital.

Our Vision
Touch Foundation (Touch) and Bugando Medical Centre (BMC) recognized the importance and opportunity connected to biomedical engineering – addressing the challenge of medical equipment outage could deliver a step change in the ability of developing health systems to provide high quality and life-saving treatment.
Starting with BMC which, as a tertiary referral hospital, serves a catchment population of over 16 million people, our 4-year Health Technology Management (HTM) program was launched to establish a replicable Centre of Excellence (CoE) model for Hospital Biomedical Engineering, acting as a blueprint for leapfrog improvements in medical engineering across the continent.

Gaps in Biomedical Engineering
- Technical skills lag behind equipment complexity
- Lack of necessary tools and testing devices
- Immature or unstructured systems and processes
- Outdated infrastructure

General sustainability barriers
- Low investment in engineering vs. clinical
- Missing cultures of performance measurements
- Lacking focus on organization and safety
- Unstructured talent development
Mind-set change and operational excellence were achieved through investment in best practices, systems and processes, people and infrastructure:

**Embed private sector best practices**

Establish and sustain a culture of performance measurement, workplace organization and accountability through:

- KPIs – daily tracking of critical department performance indicators
- Routines – established personal activity plans
- 5s – workplace organization and safety focus

**Integrate targeted systems and processes**

Embed targeted systems and processes that enabled efficiency and workflow standardization including:

- MRV system – work processing through central help desk
- WIP room – organized Work In Progress areas to streamline equipment repairs
- Spare and inventory – central spares inventory management

**Develop capacity and skills of staff**

Implement a talent development strategy to sustainably raise confidence and service standards including a detailed capability assessment and on-the-ground mentorship

**Improve infrastructure to support behavioral change**

Construct a state-of-the-art workshop with glass walls and a tech-enabled open plan area for collaboration and innovation
The HTM program has transformed the ability of biomedical engineers to serve the hospital and the region.

Embed private sector best practices

Mind-set change, through the adoption of private sector best practices, was used as a foundation in the implementation of initiatives across the engineering department, and a key element to ensure long-term program sustainability.

Integrate targeted systems and processes

Driven by changed mindsets and improved workplace routines, digitally enabled work processes and systems unlock the next level of operational efficiency potential. Implementing simple, fit-for-purpose tech solutions for work order, inventory, and spare parts management was paired with processes for preventative maintenance (PPM), budget management, and activity planning.
A newly constructed state-of-the-art workshop is promoting transparency and accountability by using glass walls, encouraging collaboration through dedicated open spaces, and driving workplace efficiency by deploying visual boards that showcase real-time department performance.

Institutionalized
Performance Improvement Plan & Talent Development

100% of engineering staff with job descriptions

Knowledge sharing
sessions with other engineers and technicians from the Lake Zone for capability building and knowledge exchange

“Best in Africa”
Expert opinion of new workshop

A newly constructed state-of-the-art workshop is promoting transparency and accountability by using glass walls, encouraging collaboration through dedicated open spaces, and driving workplace efficiency by deploying visual boards that showcase real-time department performance.

Sustainability

Engineers are now sustaining these initiatives, fully embedded in their own routines and approach to work, building a solid foundation for long-term sustainability

This holistic approach has allowed the engineering department to lead performance improvements in the wider hospital:
Success factors

Two non-conventional factors were crucial in driving the program towards successful outcomes: the use of a co-investment approach for any major direct investment and bringing Tanzania’s top class private-sector industry standards and mindset to the engineering ways of working.

Co-investment to drive sustainability

- Hospital investment in annual operating & spare parts budget
- Hospital investment in eHMIS
- Hospital co-funding to hire full-time technical performance manager

The Stage Gate approach allowed all stakeholders to remain aligned on mutual commitments and adjust expectations along the journey.

Partnering with Tanzania’s best

Partnership with TBL Brewery Mwanza (Previously ranked Top10 worldwide for operational efficiency), including training and knowledge sharing between engineering teams

BMC hired a former TBL Brewery Quality manager as Technical & Performance Manager. Because of their experience at TBL Brewery, a company previously ranked in the global top 10 for operational efficiency, they were able to bring private sector industry standards and mindset to the engineering department. The partnership with the brewery also facilitated knowledge exchange sessions with TBL experts to learn operational best practices and top-quality standards of work environment.
Approach & Lessons
Deep Dive
IMPLEMENTATION AND SUSTAINABILITY IN USING BEST-PRACTICES ACROSS THE DEPARTMENT

KPIs
Daily tracking of critical department key performance indicators (KPIs), regular reporting, and use for decision-making across teams

Routines
Personal activity plans, with structured tasks and planned meetings were conducted along with daily task monitoring (action logs) to ensure team activities were completed on time and to a high standard

5S
Create workplace organization and focus on safety, ensuring all areas of engineering ownership comply to standards

- Sort: Separate out needed tools, parts etc from unneeded items
- Set: Organize the needed items that remain
- Shine: Keep the work area clean
- Standardize: Schedule regular cleaning and maintenance by conducting sort, set, shine daily
- Sustain: Integrate 5S into routines
EFFECTIVE OWNERSHIP AND ADMINISTRATION OF CRITICAL SYSTEMS AND PROCESSES THAT ARE FIT-FOR-PURPOSE

Work order management system

IT-based work order system and process integrated with the wider hospital driving performance across the department.

Work in progress room

Organized work in progress areas with different stages to separate workstreams, streamline repairs, and improve engineers work organization.

Spares & medical equipment inventory

Engineering owned spare parts allowing critical spares to be available when and where required. Inventory system and process also in place, providing clear visibility on medical equipment status.
Focus on Client Service

Dedicated front of house to manage clinician requests and display department performance indicators transparently.

Improved accountability and transparency

Spaces designed to support system and process improvements. Each activity has a fit-for-purpose home (e.g. spares management, work in progress, maintenance). Glass is used instead of walls to encourage productivity and transparency.

Open areas

Tech-enabled team working areas for collaboration, innovation and co-creation.
APPROACH DEEP DIVE:
People & Talent development

Hire of Technical & Performance Manager by hospital
On the ground daily expert mentorship through new role created by hospital leadership

Detailed capability assessment & talent development workplans
Job descriptions for clear roles and responsibilities, skills matrix to set-up training program and long-term succession planning

Knowledge exchange sessions with engineering team from regional hospital
Training, knowledge sharing, and collaboration sessions with experts and engineers from network facilities
LESSONS LEARNED & KEY TAKEAWAYS

Changing mindsets and behaviors of the engineering team by implementing private sector best practices, creating structured processes and systems, and enabling their productivity by providing adequate working spaces are critical factors to reach the ultimate goal of long-term sustainability. Investing in engineers’ technical upskilling and training is crucial, however, to guarantee maximum impact and success in the long-term, the focus during the early phases of implementation has been on building the right attitude and commitment across the team and developing strong leaders and managers.

- **Mindset change initiatives**, such as the implementation of operational best practices - KPIs, 5S/Kaizen and routines - require additional time and regular follow up to be fully embedded. However, prioritization of these initiatives delivers immediate performance improvements and lays the foundations for more complex initiatives (systems and process improvements, IT).

- **Deploying local experts** (i.e. Tanzanian performance manager hired from private sector) who could play a mentorship role day-to-day and reduce push back and mistrust, particularly common in the early phases of program implementation given the innovative focus on private sector mindset (e.g. efficiency) within a public sector environment

- **Improvements in infrastructure**, designed with the objective of being an enabler for process improvement and department productivity, ease the implementation of future activities and drive motivation across the team, particularly while undergoing substantial change management initiatives.
Multiple levers contribute to building buy-in across the different stakeholders and, in particular, involving all levels of management across the hospital is key to ensure ownership from the very early stages and achieve the complex technical, mindset and ways-of-working changes set out in the vision.

- Partnering and co-creating initial program activities alongside hospital top management and the engineering team is critical in guaranteeing early buy-in and ownership of activities and laying the platform for long-term sustainability.

- Given the (unfortunate but common) view of engineering as a second-class hospital department, improving communication between engineers and clinicians, by using structured, objective, and regular reporting, builds trust and collaboration across hospital departments.

- Defining, supporting, and strengthening management & leadership capabilities for hospital and department heads through regular dedicated training, reflection, and planning sessions is necessary to drive accountability and performance across the rest of the team.

- Providing opportunities for engineering to act as hospital-wide champions for initiatives and coach other departments (i.e. on implementation of 5S/Kaizen) builds confidence, buy-in, and raises standards across the wider facility.
For more information:
Valerio Parisi
Chief Program Officer
vparisi@touchfoundation.org