



CHAPTER 1: OVERVIEW OF THE MEDIVENTORS CHALLENGE

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ABSTRACT

With the SA outbreak of COVID in 2020 it was decided that the country needed to develop skills for medical device innovation – while using COVID as backdrop to learn about satisfying real-world medical industrialisation demands. Various parties including the National Ventilator Project (NVP), MerSETA and others initiated the challenge. A tender process was instituted for applicants to be selected. Various parties got together under the lead of UCT, namely UKZN, WITS, CPUT and NTIP, and successfully applied for grant funding in terms of Challenge. Collectively, the consortium is called as “MediVentors”. MerSETA is the Manufacturing, Engineering and Related Services Sector Training Authority. MerSETA is both funding and overseeing the challenge. MerSETA is funded by levies collected from people being employed in various industries. This means that levies collected from the current generation of employees is deployed to fund the next generation of medical device engineers and innovators. The goal of this challenge was to:

- *Build competencies related to the conversion of innovations from post- school learning institutions to manufacturing and engineering companies;*
- *Establish relationships between universities – and between universities and industry, to facilitate future industrialisation of innovation and employment; and*
- *Encourage Higher Education Institutions towards the supply of skills equipped for a new collaborative manufacturing- and 4th Industrial Revolution paradigm.*

THE INTEGRATED SKILLS DEVELOPMENT PROGRAMME

The Integrated Skills Development Programme (ISDP) was the learning strategy adopted as part of the challenge to achieve optimal outcomes. It is based on international best practice by integrating different pedagogical instrument for optimal outcomes, namely:

i. Project Activity

Project activity by the students focuses on a real-life medical device challenge as a core context. Every student, from each university, worked on a medical device project as part of their academic studies. After each student had progressed significantly in their projects, they completed an abstract submission which is consolidated within this book.

Each abstract was independently reviewed by two sets of reviewers knowledgeable within the Biomedical Engineering field. If the abstract scored poorly against the set of criteria, then the submission was rejected. The set of abstracts that were not rejected by the reviewers were sent back to the authors for revisions. Thereafter, the abstracts were checked by a copyeditor and then finally formatted according to the UCT library approved format.

ii. Skills Development

Focused skills development through three courses, which support vital industrialisation competencies currently not forming part of the curriculum. The three courses that the students have participated in are:

- Medical Device Sector Essentials (MDSE) Course

Understanding the production and commercialisation of a medical device, the working of critical standards such as ISO 13485, ISO 27001 and ISO 62366, regulatory compliance and usability engineering and testing.

- Tooling, Manufacturing and Industrialisation (TMI) Course

Understanding the progressive development and transformation of manufacturing a tool to industrialised competence, applying the industrialisation anatomy considering of the implications of the 4th industrial revolution, tooling design, life-cycle optimisation, service integration and supply chains.

- Introduction to Systems Engineering and Product LifeCycle Management (SEPLM) Course

Basic understanding of key systems engineering, and product life cycle processes and activities performed during the design, development, industrialisation, and production phases.

iii. Definition of User's Needs

Placing oneself in the shoes of others by defining needs from the perspective of the customers. The students were required to complete the Lions' Den Project Proposal document which was the primary input to determine the participants who will be selected to present at the MediVentors Lions' Den Event. This document was marked by a MediVentor selection committee. The purpose of this document is to approach the project work from a customer / patient perspective and train students in convincing other parties to back their industrialisation efforts.

iv. Participation in MediVentors Lions' Den Event

Participation in a simulated real-world competition ("MediVentors Lions' Den Conference") to develop skills in promoting and communicating one's solution to garner support or funding for realisation. The goal of the conference was to simulate

a real-life challenge of any innovator, namely, to convince other parties to support their industrialisation proposal and provide funding.

The conference also detailed the courses that the students participated in and how they applied their skills to their individual projects. Finalists were selected prior to the conference who submitted the best project proposal. These finalists presented their solution to garner support or funding for realisation to a panel of esteemed jurors.

MEDIVENTORS LIONS' DEN EVENT

On Wednesday the 2nd of March, some of the most innovative minds in biomedical engineering gathered to celebrate the conclusion of the first MerSETA Virovent Innovation Skills Challenge. This challenge saw participants from various institutions across the country collaborate toward one common goal: to develop skills for medical device innovation in South Africa.

The challenge ended with a MediVentors Lions' Den Event. The competition was inspired by the television series "Shark Tank." The event provided the platform for the MediVentors to engage with other role-players in the MedTech space by presenting innovative ideas. This served to convince the industry to support their industrialisation proposal and, among other things, make funding available for product realisation.

The goal of this event was to:

- i. Witness the potential of innovations coming out of ViroVent to support an emerging SA Medical Device Manufacturing sector;
- ii. Showcase the integrated Systems Thinking-based solution as instrument for 4th Industrial Revolution (4IR) Skills Development;
- iii. Showcase the top ranked MedTech student projects and select/recognise winners;
- iv. Provide a student-centric perspective to learning and challenges faced in a post-Covid world;
- v. Offer a platform for representatives of the SA MedTech eco-system to reflect on synchronized industrialisation for optimal outcomes; and
- vi. Contribute towards bridge-building between key parties in the MedTech industrialisation value chain.

The jury constituted various stakeholders in the MedTech innovation value chain, with a total prize value of R110 000 being awarded across the board following the Lion's Den pitching event. The Lions' Den Event also included two panellist discussions namely: Innovation conversion: The skills and learner perspective and Industrialisation: Putting the pieces of the chain together. The participants and panellists actively engaged in these discussions highlighting the current gaps within the context of the South African MedTech space, specifically the current difficulty in medical device product realisation and industrialisation.

There was a total of nine finalists from across the four institutions (UKZN, CPUT, UCT and WITs) that battled it out in front of the esteemed lions. Every finalist did a commendable job with convincing the lions to support their medical device proposal. Several awards were distributed according to the participants unique proposals. Lan Xu (WITs) was awarded the WCMDC Most Promising MedTech Award (R5000), Joel Philpott was awarded the MDMSA Most Promising MedTech Award (R5000), the MediVentors Best in Action Award (R1000) was awarded to Mikhail Solomons (CPUT) and the People's Choice MedTech Award (R1000) was awarded to Pragesh Govender (UKZN).

Third place was awarded to Uchenna Okwuosa from CPUT, receiving R20 000 towards further development of the PEEP Valve, CAPTUL. Joel Philpott from UCT came second overall and was awarded R30 000 for further development of his medical device. First place for the MediVentors Lions' Den Event was awarded to UCT's Kerstin Lisa Hall and her novel design of the auto-injector. The device is called the OptiJect. Hall walks away with a prize of R50 000 to be used toward MedTech device development.