



MAKER MOVEMENT FOR MATERNAL NEWBORN AND CHILD HEALTH Process Documentation Review

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CONCERN
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- Hub creation & activity overview
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Objectives of PD

1. to examine the proposed change pathways in the theory of change to:
 1. document the emergence of preconditions, intermediate and direct outcomes of Maker
 2. explore the underlying drivers of change
 3. assess the integrity of the project design.

For Maker, the case study of DTSI is drawn from the process documentation since all DTSI activities apart from the ideation pertain to the approach taken to develop equipment prototypes

- Degrees of design thinking

The idea of the hub

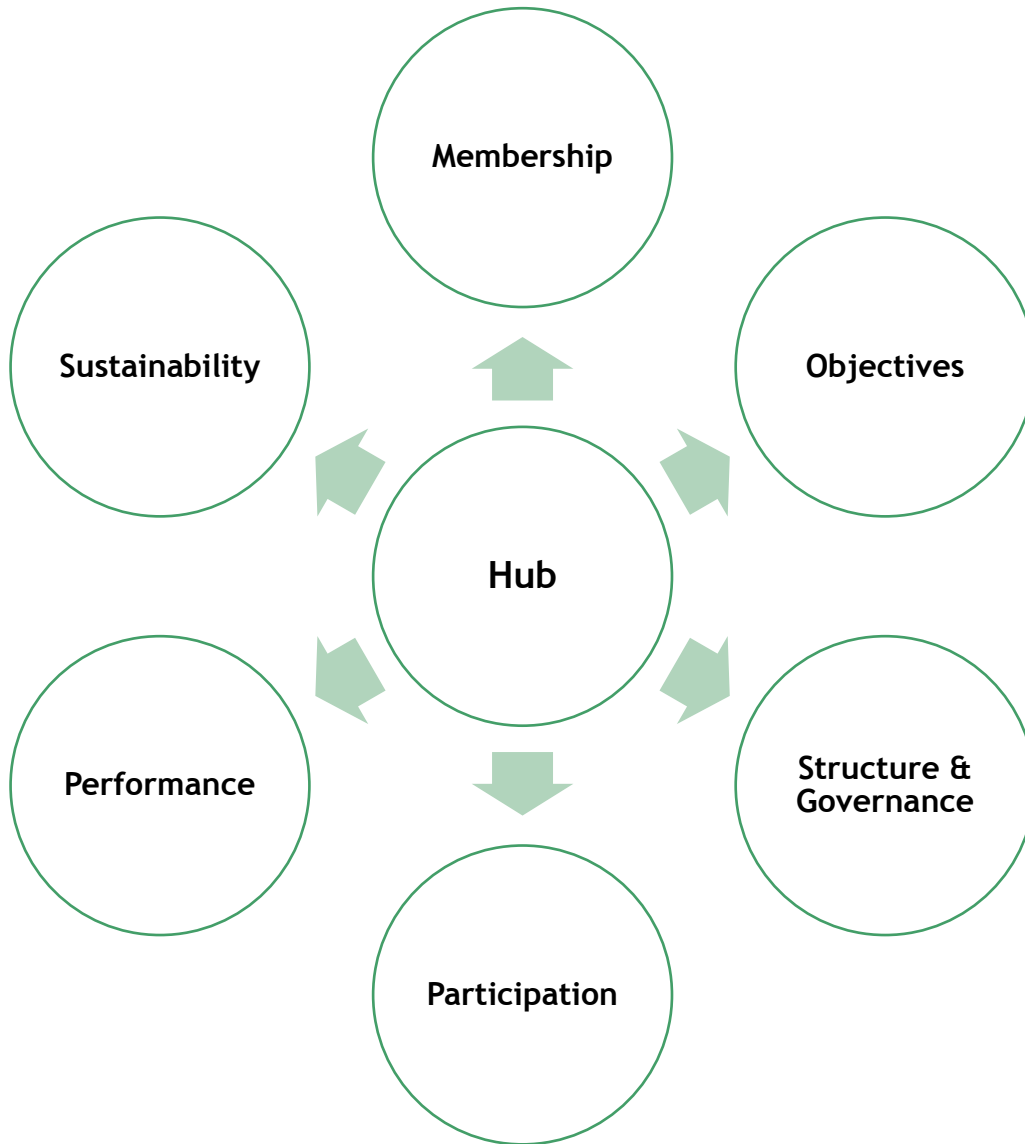
This innovation, “Maker Movement for MNCH” (“Maker”) **harnesses the creativity of the global Maker movement** to equip MNCH practitioners with essential MNH equipment and parts. It aims to address gaps in health service delivery via the creation of **low-cost, high-quality, locally designed and produced** alternatives to essential parts and equipment for MNH service delivery, using local skills and materials.

What is Innovative about this Project?

- Creating linkages between Makers and MNCH health professionals
- Creating **unconventional linkages**
- among groups with common goals related to
- improved access to medical equipment
- Addressing health systems problems **creatively**



Key Domains of Inquiry



Hub experience

Equipment

Role of Design Thinking

Revisiting the needs assessment

Designed to

- outline the **main causes** of maternal and newborn morbidity and mortality at KNH,
- describe the systems involved in the lifecycle of an illustrative piece of MNCH equipment at Kenyatta Hospital,
- identify challenges within that lifecycle that affect the supply and availability of equipment at KNH.

Findings

Extensive shortage

Shortlisted 9 pieces of equipment

Maintenance

Capacity

Infrastructure

Procurement

Cost

Standardization and user specifications

Delays during contract execution

HR capacity

Criteria for deciding on the pieces of equipment: clinical needs; procurement methods currently used for equipment and spare parts; existing infrastructure; health workforce productivity; clinical testing requirements; business model; maker capacity; in-country manufacturing capacity



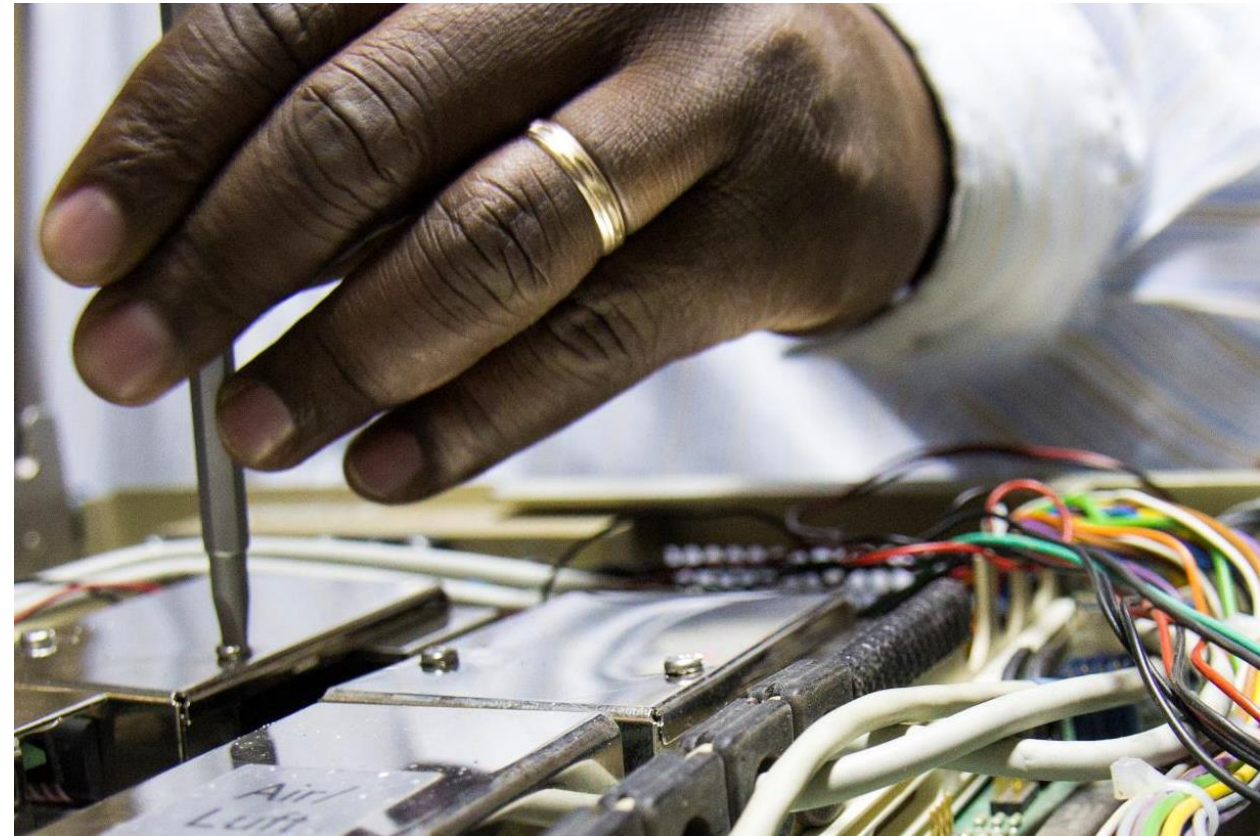
Maker Hypothesis

Hub

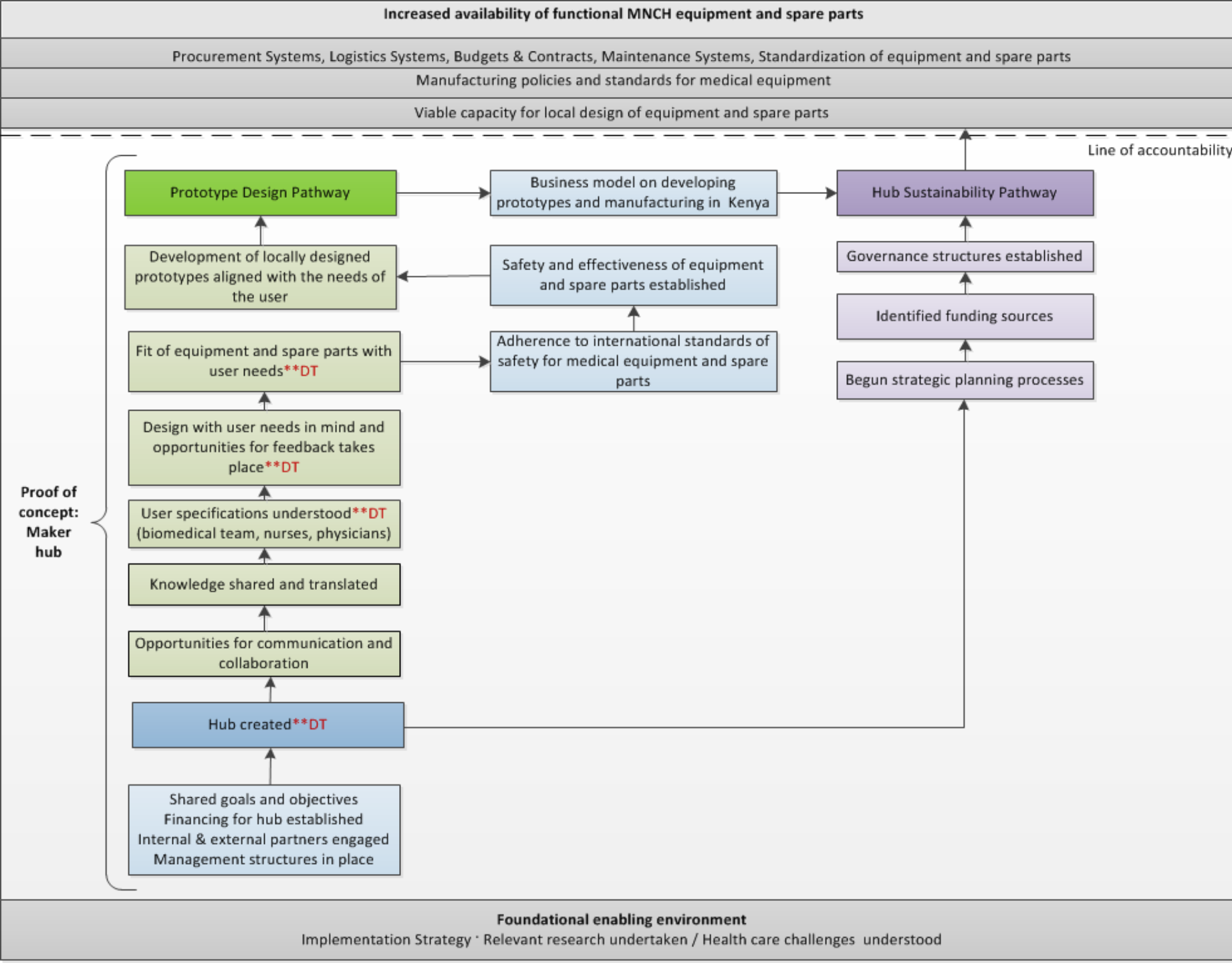
- Kenya based physicians, nurses and biomedical engineers from KNH in collaboration with University of Nairobi Fab Lab engineers (i.e., the Maker Hub) **can design and build** select equipment and spare parts for labor and delivery and newborn care locally.
- The Maker Hub model is a **viable model** that can address challenges in the social sector through creative collaboration, leadership and governance, processes for management and funding and mechanisms for problem solving to ensure its long term sustainability

Design thinking

- Application of design thinking methods and tools within Maker will:
Create designer **empathy** for end users/
target populations
Result in **fit** of problem definition
with target population/end user desires, needs,
and barriers to MNCH care
Result in **buy-in/ownership** of solution by end users



Maker Theory of Change



**DT = potential application of design thinking principles

Methods & Analysis

Multiple data sources

15 total key informant interviews
UON Fab Lab students, staff,
current and former PI;
KNH nurses, midwives and PIs;
Concern Program Manager;
KEBS

Interviews transcribed and added to
NVivo for coding

Thematic coding

The next round of data collection will
build on this data

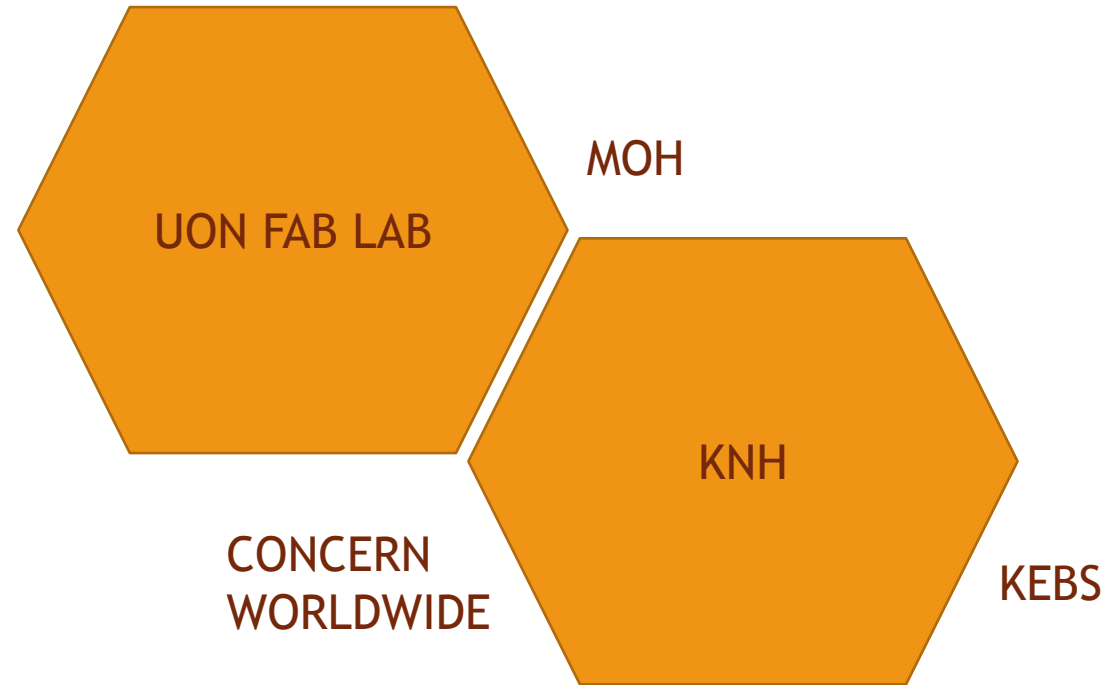


Objectives of the Maker for MNCH Initiative

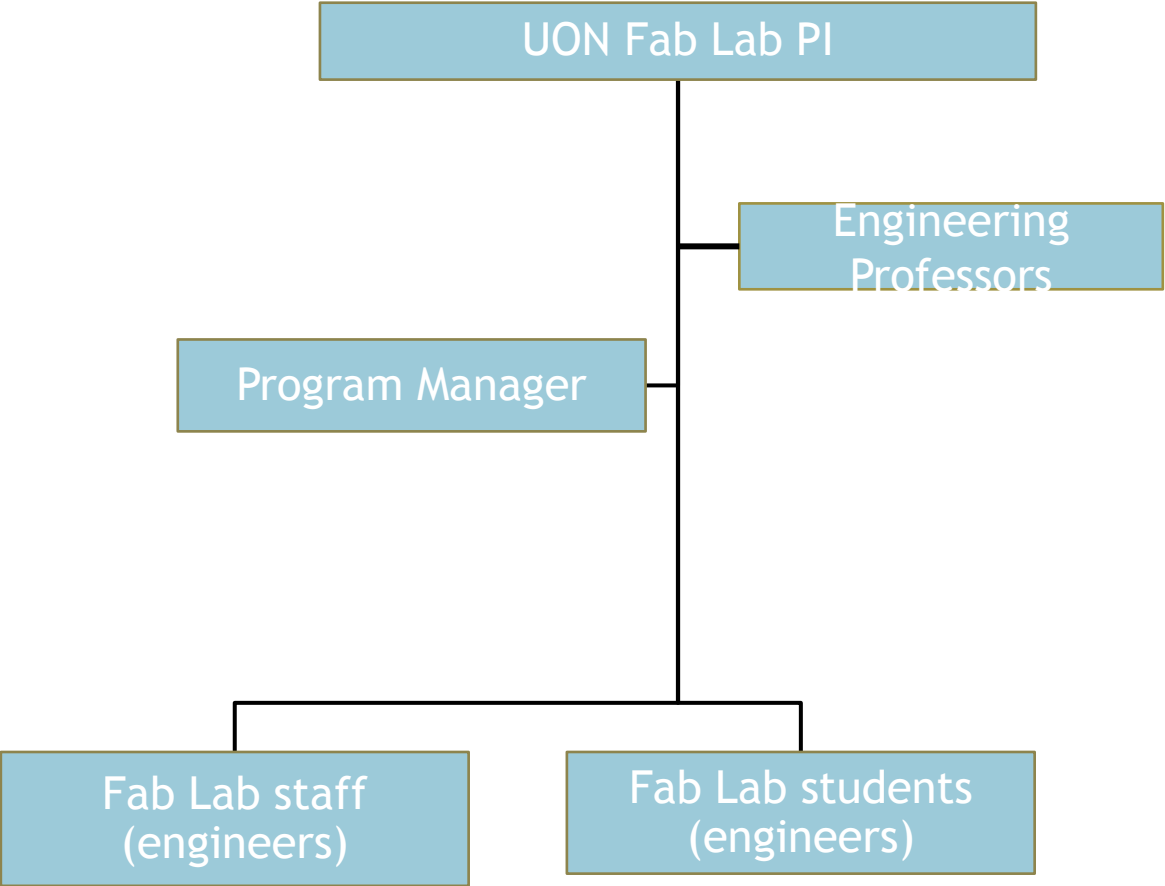
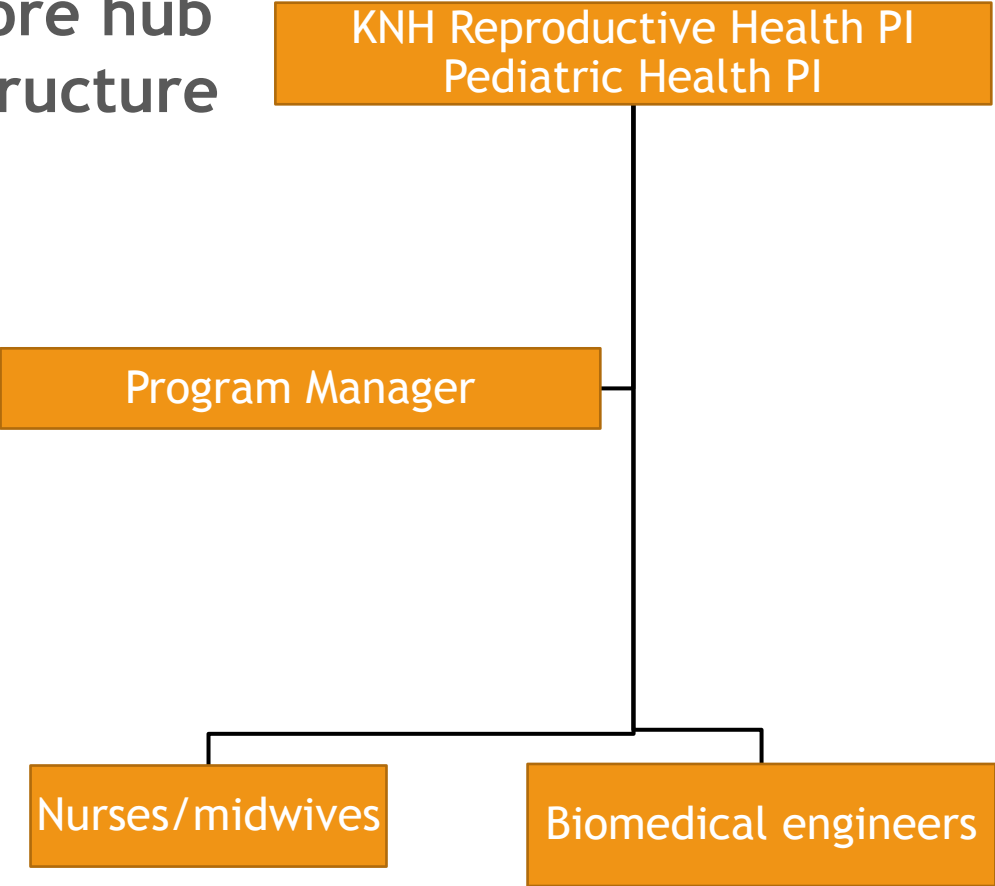
- To locally design, build and clinically test 9 pieces of equipment by December 2015
- To build the capacity of engineers at Fab Lab to locally design equipment
- To build the capacity of the biomedical team at KNH to maintain equipment



The hub: location and core members



Core hub
structure



Supported by:

Concern Worldwide (Program Management)
KEBS (Standards)
MOH (Policy)

Hub roles

PIs

- Project visionaries
- Set the tone
- Liaise with senior management

Program Managers

- Oversee day to day operations
- Manage work plans

Engineering students and staff

- Design and build prototypes

Engineering Professors

- Oversee design of prototypes

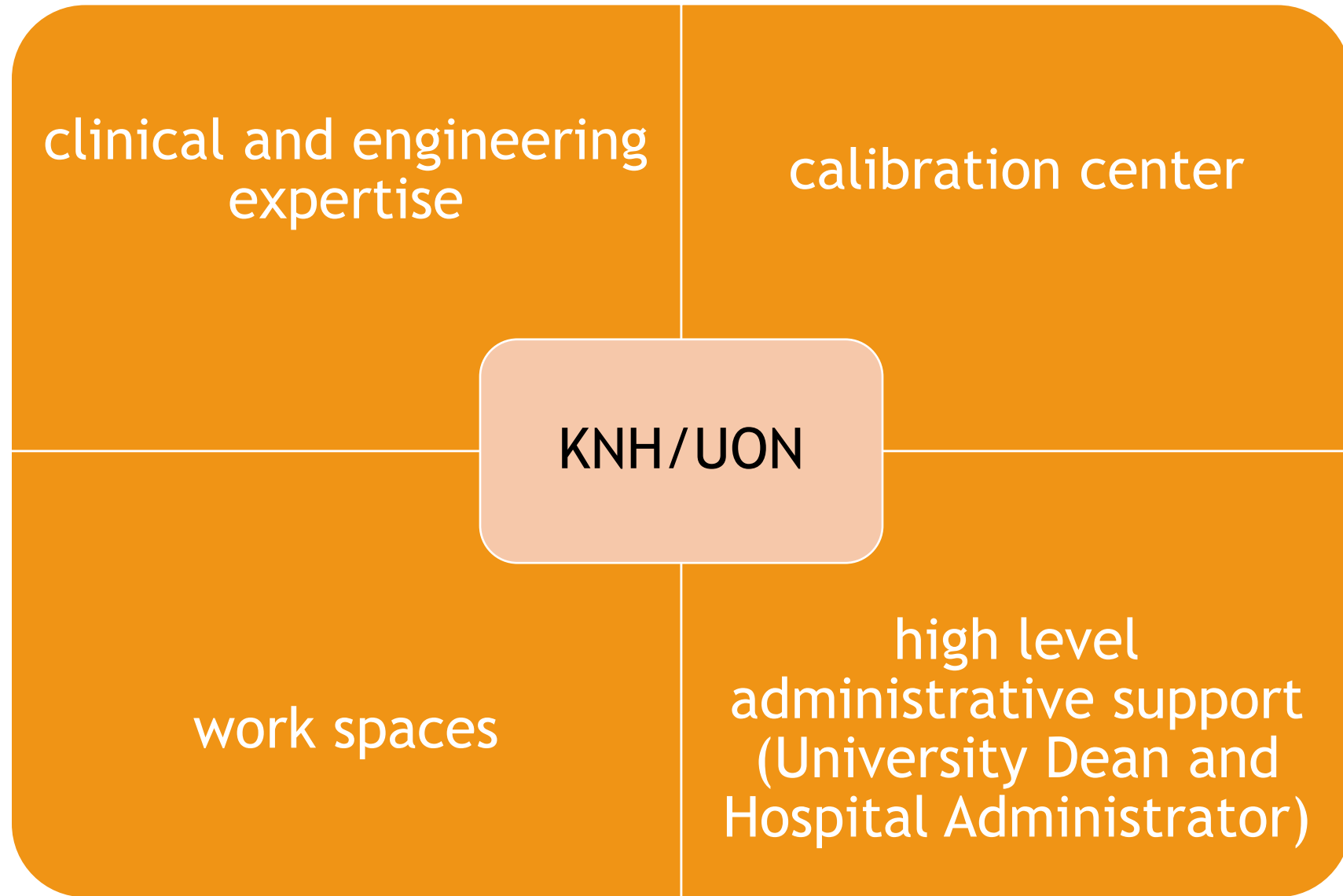
Biomedical team and nurses

- Provide critical input into the design of the prototypes

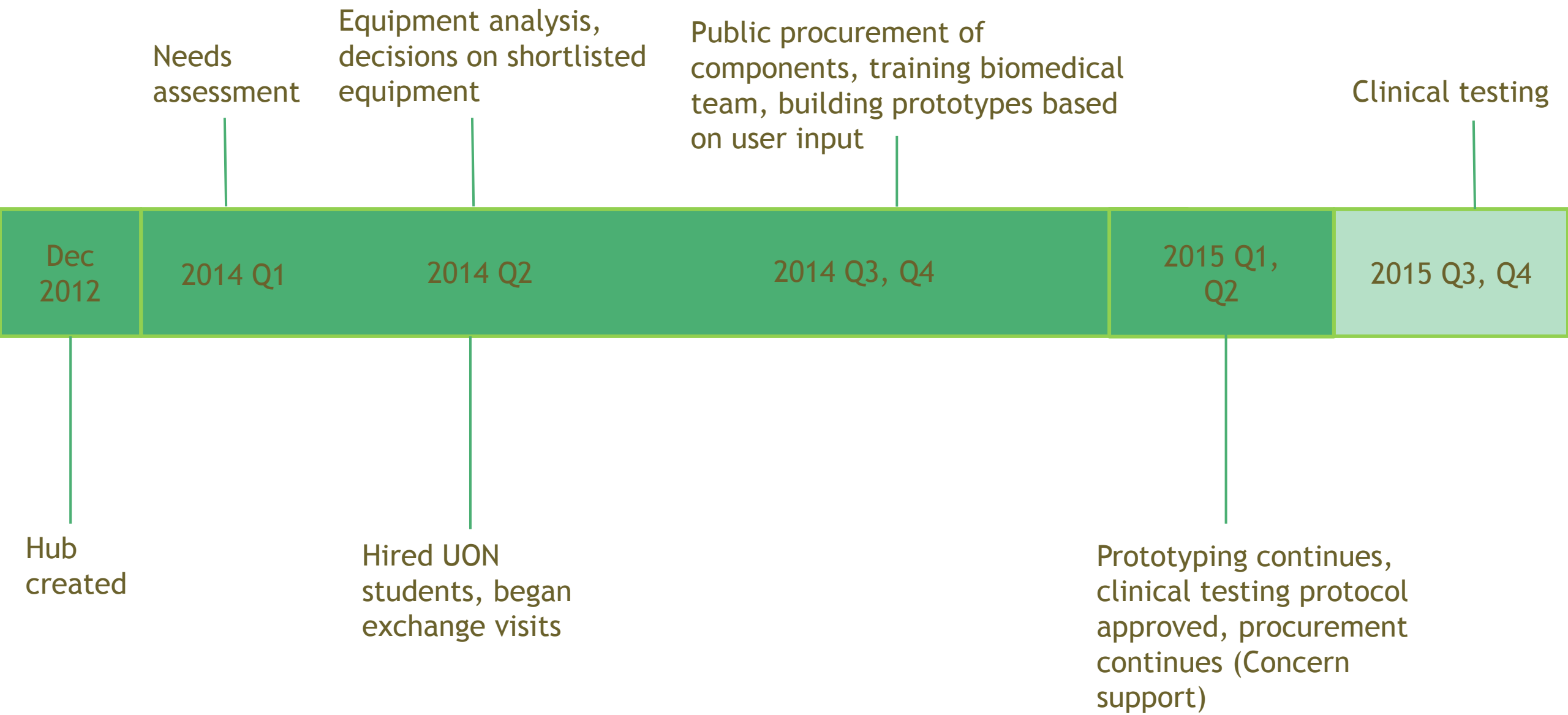


Supported by
Concern
Worldwide
Program
Manager

Partner resources: KNH and UON Fab Lab



Overview of hub activities



Findings: Hub : management & leadership, communication & collaboration

Hub Leadership & Management

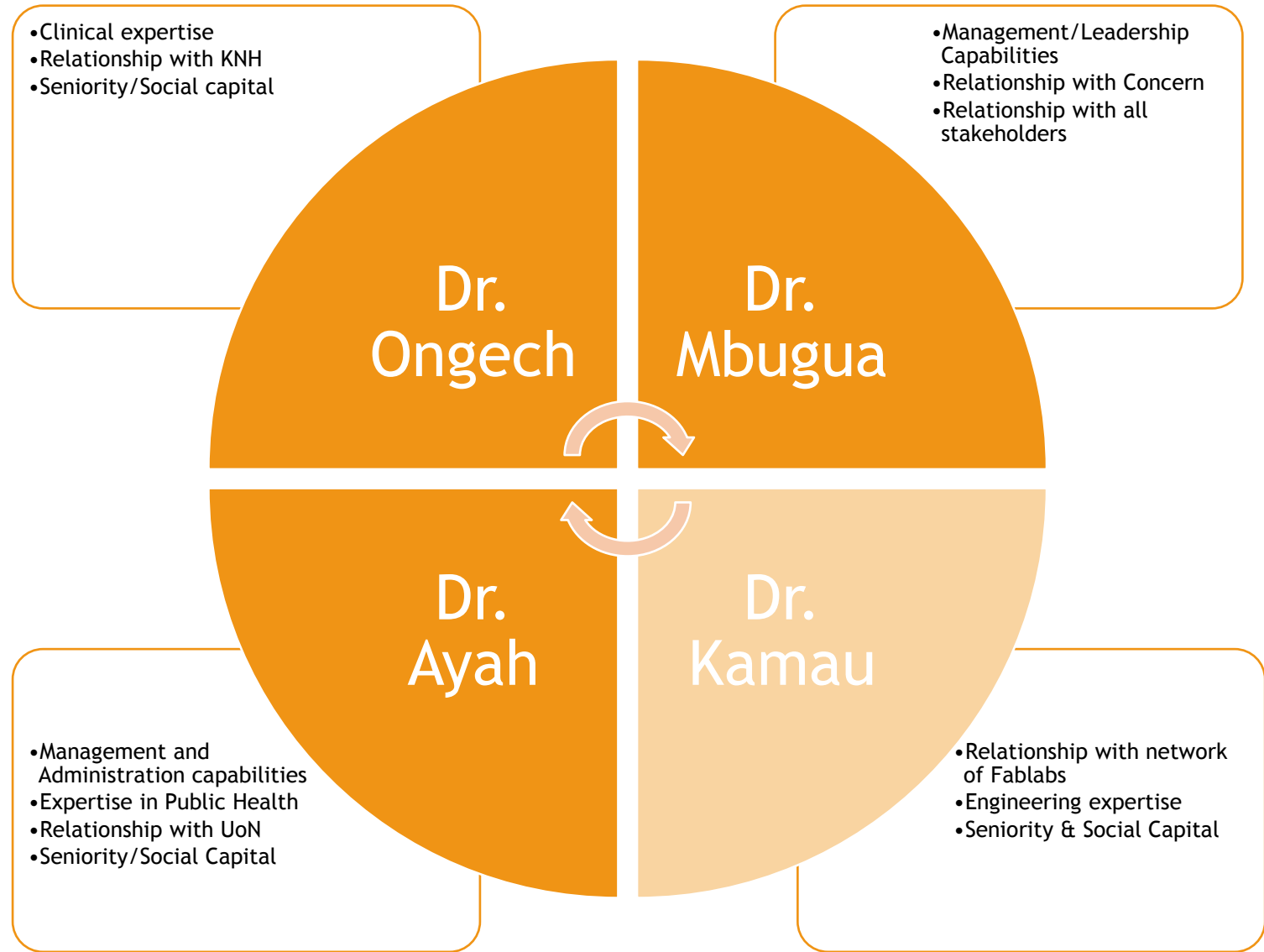
- Decision making

- Leadership

- All 3 Pls: actively engaged
- Smooth transitions when leadership changes occurred
- Continued involvement of Dr. Kamau
 - ❖ Important to retain expertise
- Dr. Ayah's addition
 - ❖ Improved organization, management and administration
 - ❖ Understanding of implications on public health

- Management

- Majority of hub meetings/activities organized by Concern
- Budget largely managed by Concern



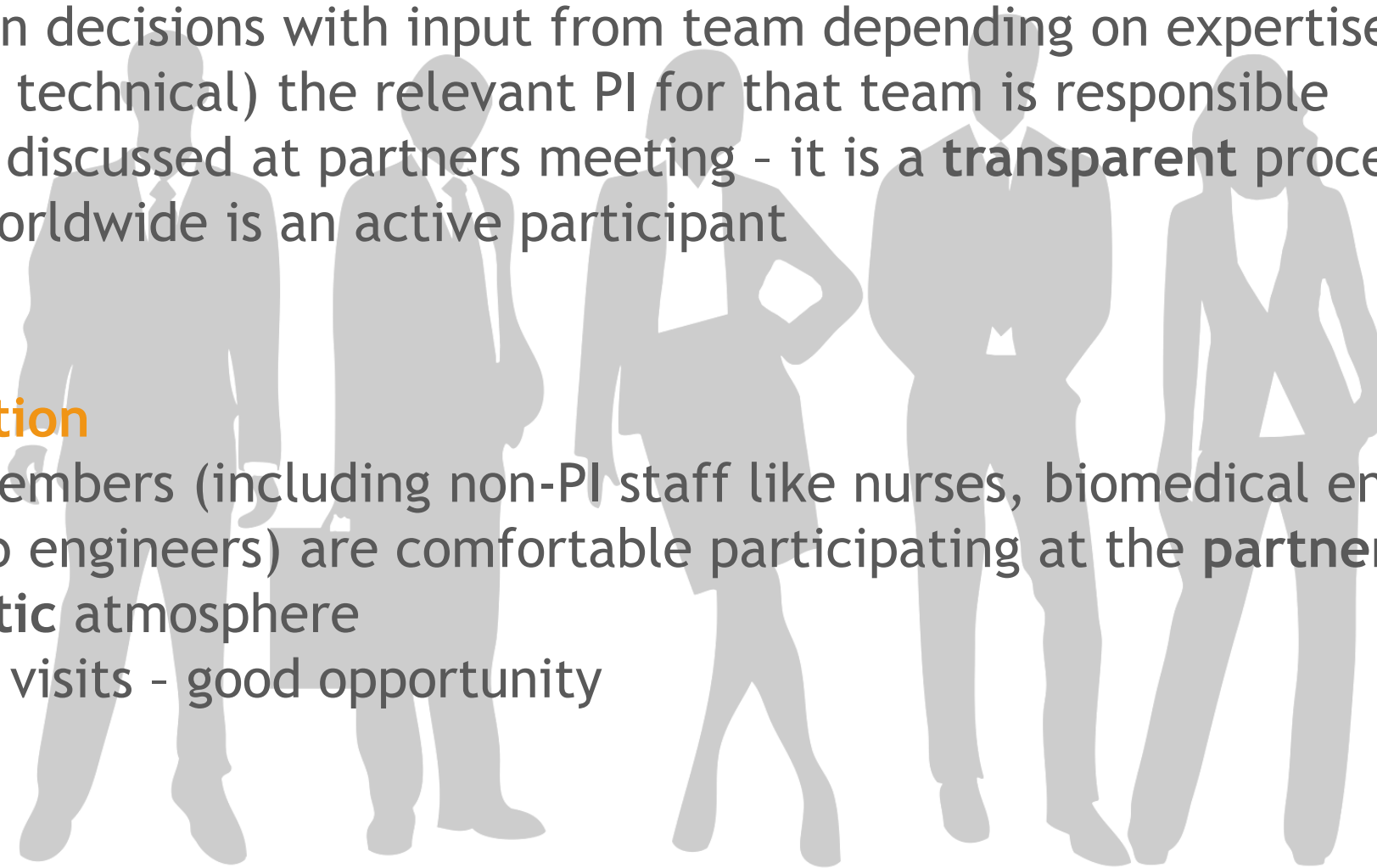
Participation and decision making among hub members

•Decision making

- PIs lead on decisions with input from team depending on expertise needed (clinical or technical) the relevant PI for that team is responsible
- Decisions discussed at partners meeting - it is a **transparent** process, Concern Worldwide is an active participant

•Participation

- All hub members (including non-PI staff like nurses, biomedical engineers and fab lab engineers) are comfortable participating at the **partners meeting**
 - **democratic** atmosphere
- Exchange visits - good opportunity



Mechanisms for communication, collaboration during prototype design

Partners meetings

Work
planning

Decisions

Exchange visits

Knowledge
about
equipment
- use and
context

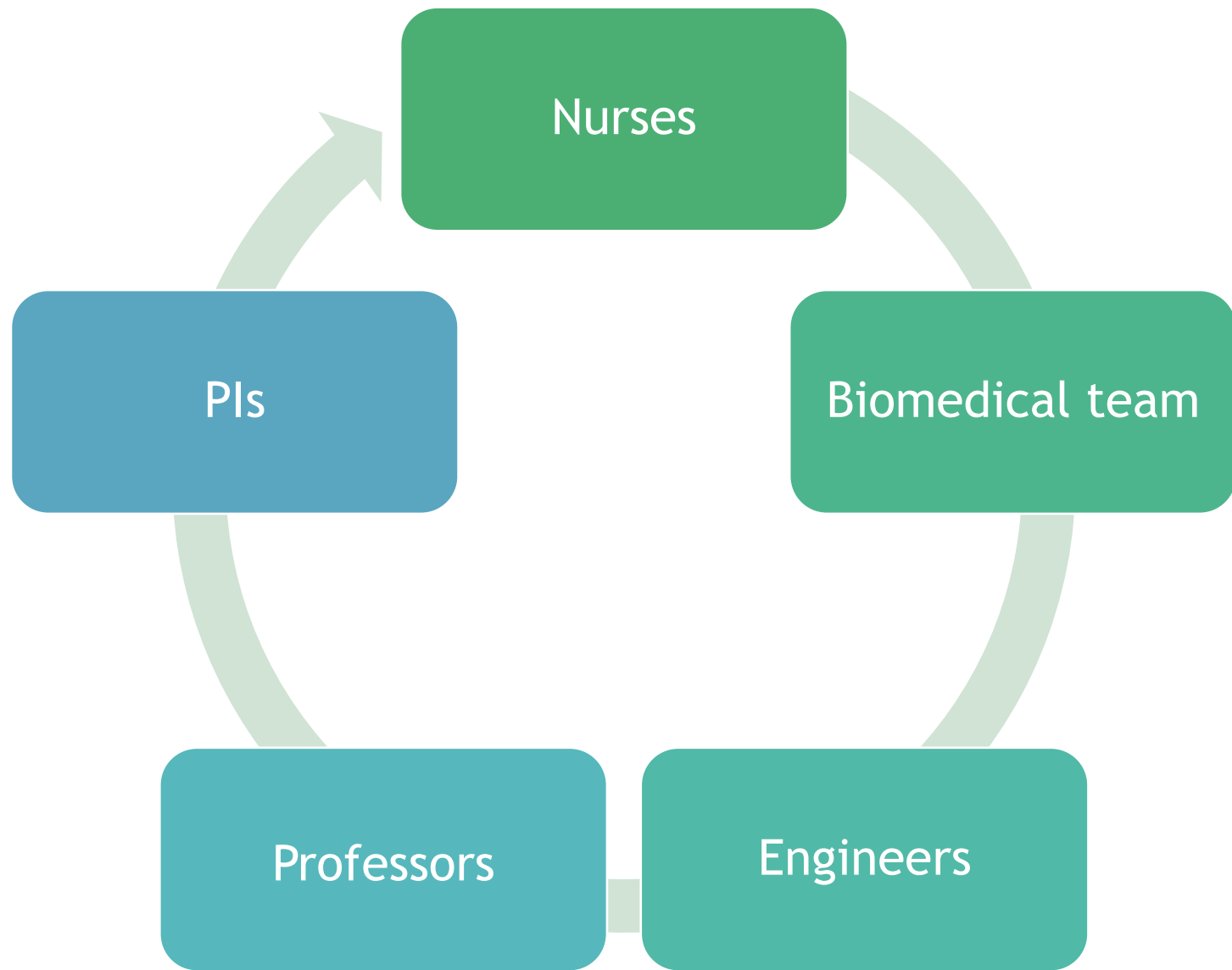
Maker portal

Engineers design documents

Equipment teams



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Reflections on the mechanisms of communication during prototyping: Partners Meetings & Portal

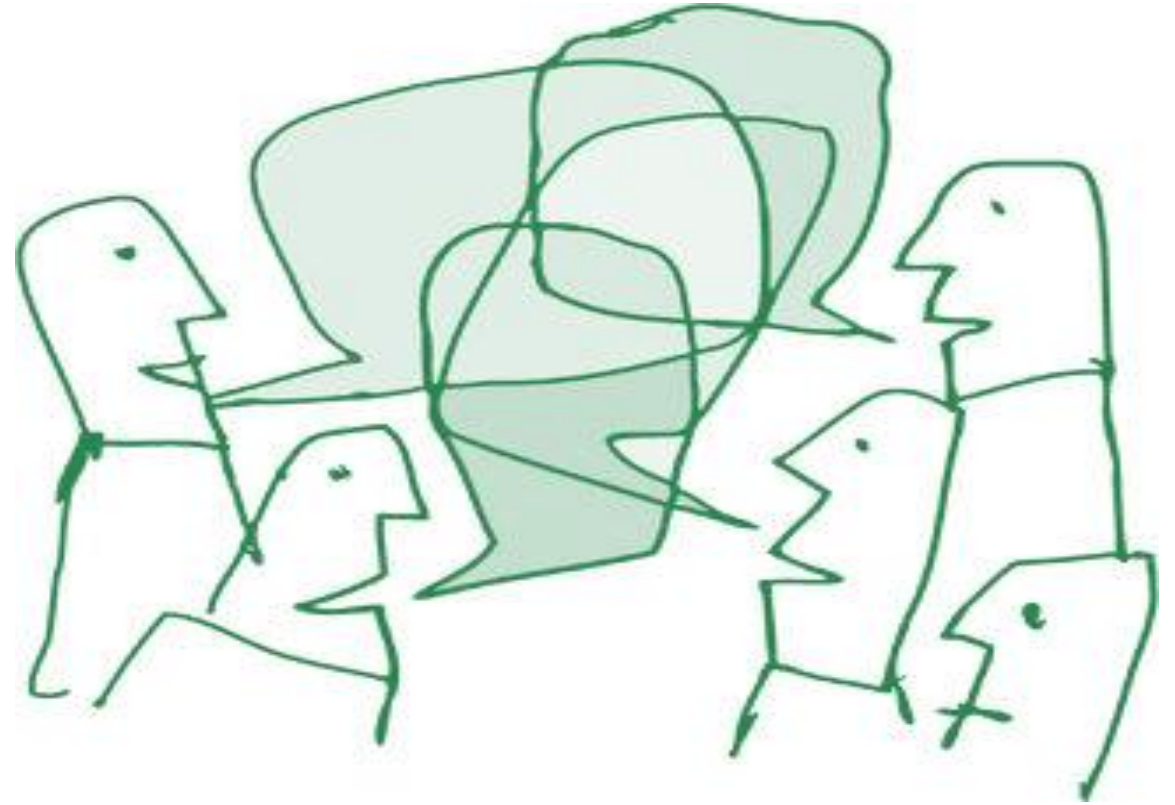
What works well

Partners meetings are effective because they are:

- frequent
- keep people informed about prototyping progress
- well run with agendas

Challenges

- Scheduling is challenging due to multiple schedules that require coordination
- Portal use has been a challenge - university has regulations that limit who can use the portal, not everyone knows about the portal and how to use it so maybe spend time training



Reflections on the mechanisms of communication during prototyping:

Exchange Visits

What works well

Cross sharing of expertise has taken place through these visits
Engineering students understand real world application of engineering theory

“I can actually say the **engineers have become medics** because when they came here, they learnt so fast. It was not very hard to interact with them because they easily got the concept and carried it on..”
- KNH Nurse

Challenges

Making time for the exchange visits
Takes time to translate expertise for the other team
Keeping nurses informed about progress on each piece of equipment



Application of Design Thinking in Understanding User Specifications: KNH Nurse Perspective

Some of the current Fab Lab staff attended the HCD workshop facilitated by Thinkplace.

Students and staff who did not participate in the HCD workshop by Thinkplace were introduced to it by other Fab Lab staff.

While formal tools of HCD were not applied during prototyping, the principles of incorporating user feedback were deeply imbued in the ethos of the engineers.

“What we didn’t do is get the equipment away from the ward, we made sure they came to the ward; we didn’t put a room somewhere for them to just tell them because they wouldn’t have gotten the concept and why it’s important” - KNH Nurse

On the vacuum extractor

“The last one that they actually showed us was what we expected...” - KNH Nurse

Application of Design Thinking in Understanding User Specifications: UON Fab Lab student perspective

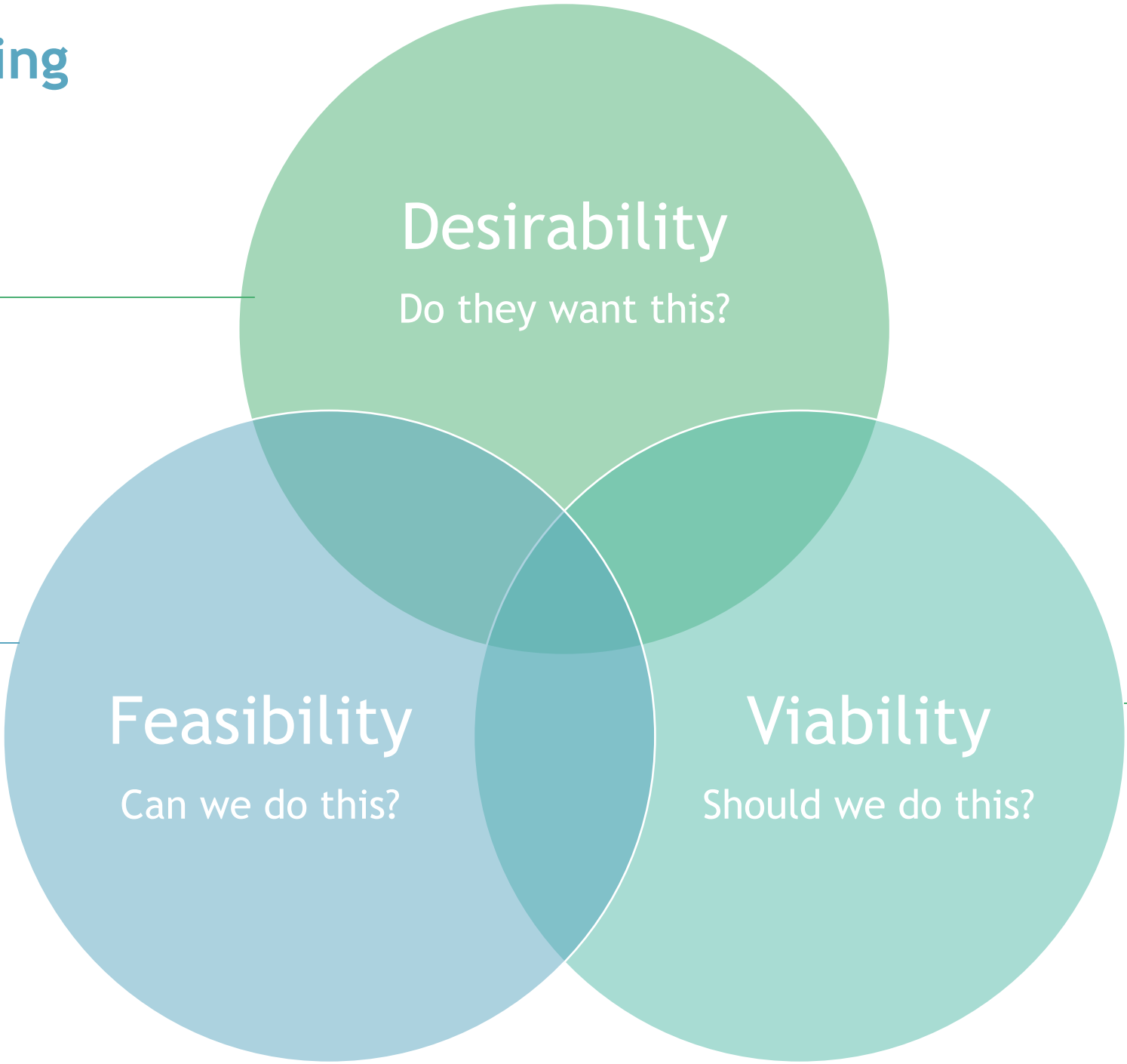
“It was pretty interesting... because they actually explained to us, apart from not having the right number of equipment, also the way it was designed, they wanted a lot of changes, like the nurse would tell us the **handle was too low**, bring the handle up, the gauge is too small so make it bigger and **make the controls a lot simpler...**”

“Let’s say it **gave us a broader perception of engineering** as a whole.. the first thing that really opened my eyes was the HCD, I have never really thought of that because as an engineer when am designing something it’s based on what I like, what I want **then it actually hit me no it’s what they want, what they need** so it actually made me realize that design process is actually based on the needs, not just my own innovation... so I actually did a lot of research and found out about other organizations that do this, they actually go and talk to the locals, find out the problems then the design is centered around their needs ...it was a wholesome process all in all , I really enjoyed it.”

Decisions during prototyping

Nurse requirements
Kenya context

Available components
Ease of sourcing
Time required



Cost
Business goals

Adherence to international standards of safety

KEBS is the main partner for this.

KEBS maintain national standards and its capability is in three areas

- International standards
- Secondary standards
- Working standards

Need to consider legal standards for all equipment where people have to pay for services

“The beauty about Kenya Bureau of Standards is that we have a high profile. By law we are supposed to maintain our measurement standards, so that means that we can cover a whole wide of range of measurement capabilities from mass measurements, pressure measurement which include vacuum measurement all the way...” - KEBS

Critical contextual issues

Policy

- National emphasis on MNH
- Office of the President
- Innovation Policy
- Free maternal health policy



Your are here » Home » Health

President Uhuru Kenyatta's medical equipment plan gets a boost of Sh4.5b

BY ALLY JAMAH

Updated Thursday, June 11th 2015 at 23:50 GMT +3

[Tweet](#)

NAIROBI: The Government plans to use part of Sh59.2 billion allocation to the health sector to lease medical equipment for the counties' free maternity programme, health workers' training and improvement of

Strong institutional support

- KNH and UON provide institutional support

Push for transparency

- Push for transparency in government may have extended the time required for procurement procedures

What has worked really well

Sense of accomplishment

Motivated and committed members - KNH & Fab Lab

Management by Concern has been recognized

Broken down siloes between engineers and clinicians

Immense trust between teams: KNH & Fab Lab
One engineers took his wife to KNH for delivery!

Committed to problem solving: e.g. public
procurement challenge addressed by procuring
through Concern in the short term

What was once abstract, is coming to fruition

The capacity of the KNH biomedical team and Fab
Lab engineers is gradually being built

Clinical testing protocol approved early!



Sense of accomplishment: building the suction machine

“**The highest moment** was when they switch on the suction machine **and it actually works** the first time, that was interesting though they have been in the workshop for about a week, it was the first project, they have been in the workshop for about a week, **they have struggled through I think four alterations of the machines**, you know you cut the metal and its, this is not going to work.. so **finally they have managed to put it together** and it looks like it would work and then you are just, we are actually not sure its going to work and its there, its vibrating and pumping and then the realization that the **design has gone beyond expectation** because we are expecting the machine to be noisy because this is a pump and its moving at high speeds, we are talking about some loud vibrations stuff like that but that thing was near silence, that was unexpected, that was one of those moments”.

“Yes there was **a lot of selfies**, a lot of pictures were taken with the machine”. --- UON Fab Lab Engineer

Challenges faced by the project



Challenges within teams

- UON students balancing school work and Maker
- IP issues : engaging other Fab Labs, managing student expectations about IP
- Retaining students

Shared understanding of Maker objectives for the next 6 months

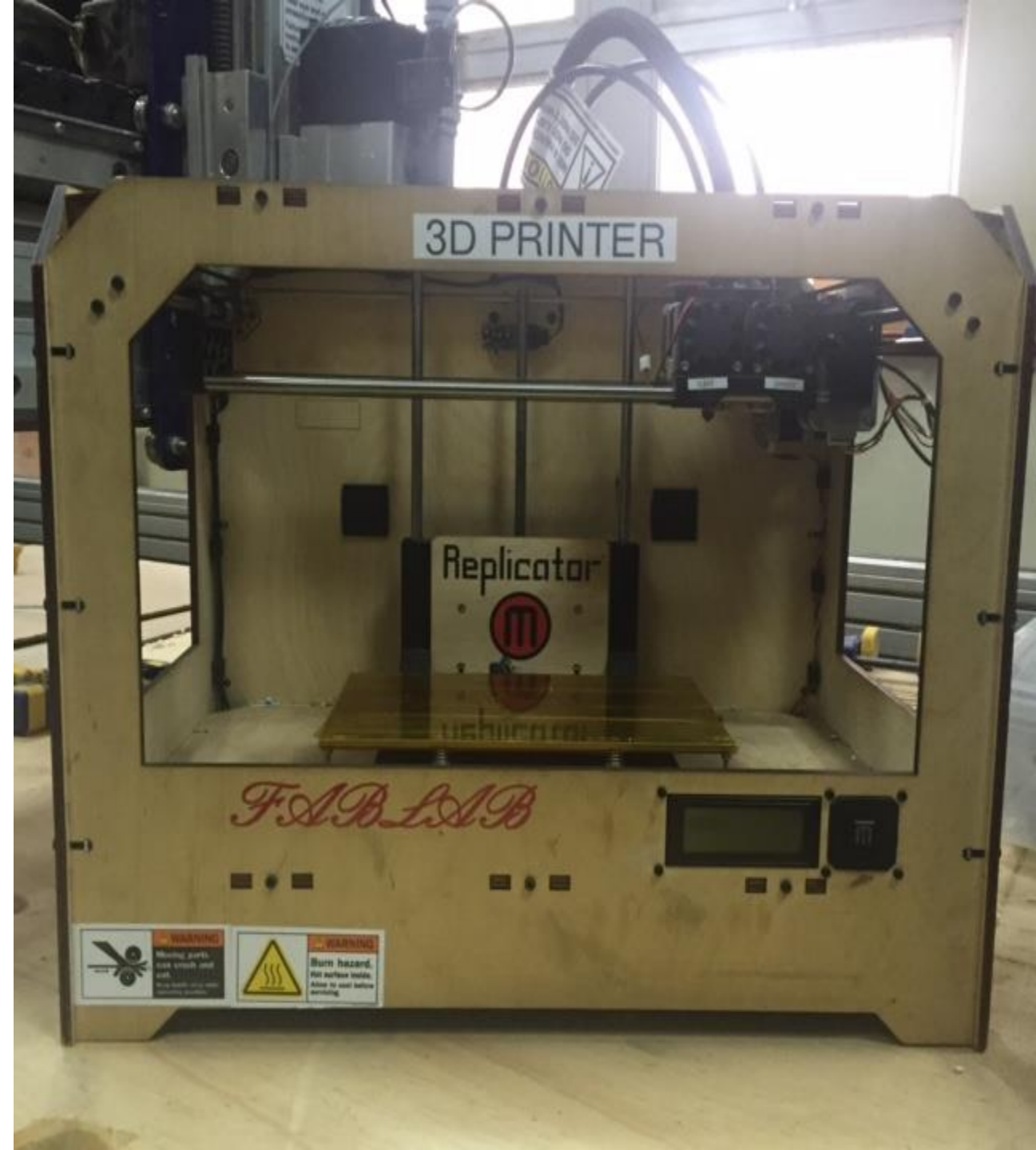
- Teams have different understanding of what Maker is cumulatively expected to achieve before the end of the project i.e. December 2015

Project delays influenced by:

- Public procurement of parts needed to build equipment
- The time required to build capacity of UON Fab Lab students
- Navigating the university system

Hub sustainability pathway: Emerging issues to consider

- People have begun to think about it
- Knowledge about efforts by Concern Worldwide HQ and Concern Worldwide Kenya (Edwin) to secure resources
- Actions that need to be taken
 - Need to identify market
 - Examine potential for scalability
 - Build capacity for procurement
 - Study domestic manufacturing viability
 - Create management and operations structure
 - Post project “Maker” will be housed in the Science Park - plan for it



Recommendations

Planning

Regularly review individual team work plans and overall project work plans to ensure all are in sync

Plan for the short and medium terms

Identify a day of the week every month when the partners meetings happen so its on everybody's calendar

Potential project outcomes by December 2015

Important to ensure everyone is on the same page regarding outputs for Maker by December 2015

Maybe focus on one piece of equipment and take it through to marketing and sales



Recommendations



Keeping people motivated

Engineering students get certificates, exposure through conferences and trainings, improved capacity which will help with employment

Biomedical teams have attended trainings

Nurses have expressed interest in attending trainings and conferences

Sustainability planning

Ensuring that the knowledge and skills gained in program management and HCD are maintained within the hub after the project ends. Recommendation: make HCD part of organizational fabric, culture, create manuals so its becomes part of MO

Consider public procurement challenges going forward

Prioritize project sustainability issues as identified earlier