



# FROM INTUITION TO IMPACT

## APPENDIX

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# A

## Interview guide

### Interview guide for initial phase field research: Determine the requirements

Topic 1 - understand the product requirements

What is considered to be market conform for RSI product related?

What are the pros of using RSI?

What are the cons of using RSI?

What is considered to be market conform for SUSI product related?

What are the pros of using SUSI?

What are the cons of using SUSI?

What is considered to be market conform for EI product related?

What are the pros of using EI?

What are the cons of using EI?

Topic 2 - understand the service requirements

What is considered to be a market conform service for RSI?

What is considered to be a market conform service for SUSI?

What is considered to be a market conform service for EI?

### XXX. Interview guide for Field research: Validate the requirements

Topic 1 - getting to know each other

Name, function, type of hospital

Topic 2 - understand the value of second-life surgical instruments [assumption 1.1]

How many times can a second-life SUSI be used?

How many times can a second-life RSI be used?

Would you mind using an EI?

Topic 3 - uncover market opportunity to realize market conform product [assumption 1.2]

What do you think of the quality of our second-life SUSI?

What do you think of the quality of our second-life RSI?

What do you think of the EIs?

Topic 4 - uncover market opportunity to realize market conform service [assumption 1.3]

How do you determine when a SUSI is not good enough anymore?

What are you willing to pay for this SUSI?

What are you willing to pay for this RSI?

What are you willing to pay for this EI?

What would the result be of incorporating second-life instruments (SUSI, RSI, EI)?

Topic 5 - understand the procurement procedure [indirect input for

# B

## Participants field research

### Nairobi

Palladium Kenya - Rose Nzyoka (country representative)  
Healthy entrepreneurs - Mary Mousa (global health expert)  
Dutch Government Global Health and innovation - Sarah Spronk  
AAR Hospital - Dr. Aysha Edwards (Head of Clinical Services)  
Upper Hill Medical Centre - Mr. Robert Karanja (General Manager)  
AMREF Health - Ms. Fatuma Said (Business Development Manager)  
Christian Health Association of Kenya (CHAK) - Dr. Samuel Mwenda (General Secretary)  
Medical Student Association - Dr Ziebedee Npakwara Motanya (president)  
Marianne Hangelbroek - AMREF Flying Doctors (Head Team Partnerships)  
RFH Healthcare - Dr. Joan Kinyanjui (Head of Supply)  
Saloni Chandaria - Africa Health Business (Associate)  
Enya Séguin - Delft Imaging / Baby Checker (Unit manager)  
Railway Healthcentre Kisumu - Victoria Alfreno (Director)  
YETI Foundation - Willem Boellaard (Director)  
YETI Foundation - Doeke Hekstra (Director)  
Crown Health - Shilen Thakrer (CEO)  
AMREF Health - Ms. Fatuma Said (Business Development Manager)  
Kenya Association of Private Hospitals (KAPH) - Dr. Elizabeth Gitau (President)  
Ms Anne Ngumba - Africa Health Business (Business Development Executive)  
Alicia (build lvl 6 hospital)  
Kijenzi - John Gershenson (co-founder)  
Willem van Prooijen - Meduprof-S (Managing Director)  
Dutch Embassy - Joris van Bommel (Vice-Ambassador)  
JOOTRH - Dr. George O. Rae (CEO)  
The Governor of Kisumu  
Noblestride Capital - Evans Wesonga (Managing Director)  
Kenya Medical Practitioners Dentists Council - Dr. Eva Njenga (Chair)  
Penda Health - Mr. Robert Korom (Chief Medical Officer)  
UN - Arif Neki (founder of financial investments)  
Pharmaccess - Milicent Olulo (Regional Director)

### Kisumu

St. Jairas - Dr. Jackton Onyango (Medical Officer in Charge)  
Tayiba Medical Centre - Maryam Abdul Majia (Medical Director)  
Peter - Orthopedic Surgeon  
Kisumu specialist hospital - Dr Bitta Ceasar (CEO)  
Dr. Gregory Ganda (Minister of Health / Chief Officer of Health)  
Bloom Surgical - Dr. Gwer (Obstetrition)  
Bloom Surgical - Abass (Administrator)  
KMET - Griffin

### Kakamega

St. Elizabeth Hospital - Theri (theatre technician) & Elizabeth mukumu (procurement officer)  
Lukanji community Health Clinic - Nancy Shimule Shileche (Medical Director)

### Mombasa

KRA - John Sidwaka (in charge of the container terminal)  
Ganjoni Hospital - Dr. Sunkar (medical officer)

### Kilifi county

Mtwapa sub-county hospital  
North Coast Medical Training College - Marianne Darwinkel (Director)  
Khairat - Dr. Abubakar (Chief director)



# Field research journal

## Day 1

On the first day in Nairobi upon arrival, two checked bags were scanned and directed to a separate counter. The individual manning the counter was unsure of how to proceed with the donated surgical equipment. Upon showing documentation indicating the equipment was for hospital use and a donation, a supervisor was summoned. It was clarified that the equipment had no value in the Netherlands and was being donated to see if it could be utilized in Nairobi. The research team is looking to establish a proper protocol for the donation and will be seeking a letter of intent from a hospital to use the equipment as well as providing evidence that the equipment has no value. In general, there are no taxes on surgical equipment. The team was well-rested despite limited sleep on the flight and had an interesting conversation with a local individual who shared tips, including not scheduling back-to-back meetings as locals tend to do so.

## Day 3

On Day 3 in Nairobi, the focus shifted to exploring potential business opportunities in the medical field. During a meeting with Thijs van Hees, an ear, nose, and throat doctor, it was noted that individuals in Kenya are hesitant towards using used medical equipment. This is due to concerns about why rejected equipment would be utilized in the country. In the past, expired eye drops were commonly used, but this practice is no longer accepted. There is limited knowledge about mechanical instruments in the country.

Joost of Healthy Entrepreneurs, an organization that aims to improve health care in underprivileged communities, was also consulted. He agreed to introduce the mission team to a hospital that has extensive experience in distribution. The question of why hospitals were the primary focus for distribution was raised and the potential for a local distributor to serve as a valuable partner was discussed. I requested contact information for such a distributor, and the International Dispensary Organization (IDA) was suggested as a potential point of contact. The team also spoke with a colleague, Mary Musa, who expressed interest in the mission and offered to assist in any way possible.

## Day 4 Mary Mousa - Healthy Entrepreneurs

During an interview with Mary Musa, it was revealed that common questions pertain to market research. These include

inquiries about pricing for surgical instruments, the quantity of instruments available, and the manner in which they are delivered and packaged. It was noted that further market research should be conducted to gather more detailed information about the purchase patterns for these instruments, including the types and brands that are most popular, as well as the prices and packaging methods that are preferred. The possibility of hiring a medical professional to conduct this research was also discussed, with an estimated cost of 500 euros. Efforts will be made to obtain lists of these instruments and to introduce the idea of not paying full price for them. Additionally, contacts will be established to assist with clearing these items at the border and an introduction will be made to a clearing agent.

## Arif Necky, an employee of the United Nations (UN)

The research results of an interview with Arif Necky, an employee of the United Nations (UN), indicate that he is highly interested in the potential for the use of disposable surgical instruments in Kenya. According to Mr. Necky, his goal is to provide funding for companies that adhere to the Sustainable Development Goals (SDG 3), which relates to ensuring healthy lives and promoting well-being for all. He suggested that the research team investigate potential funding opportunities and connect with organizations such as the Aga Khan Hospital, which has a large network of outreach clinics. He also noted that their product may be useful in larger hospitals where there is a shortage of medical supplies. Additionally, he discussed the potential for public-private partnerships in healthcare, where private institutions are contracted by the public sector to improve public healthcare, sharing the risks and returns. He argued that by improving public healthcare, more patients will seek treatment and pay through insurance, resulting in shared profits.

## Panel discussions at Health mission

The research results indicate that Level 1, 2, and 3 hospitals in Kenya are required to purchase from Kemsco, while Level 4 hospitals have budgets to spend freely. However, there is the possibility of private partnerships, which could potentially allow for bypassing these regulations. This is not a top priority, and is only of interest if there is a significant availability of supply.

Panel discussions revealed that there may be potential for collaboration with organizations such as AIV and Pharmaccess. AIV, represented by Sarah Spronk, is particularly interested in the first pillar of this initiative. Pharmaccess, represented by Milicent Olulo, the Regional Director, emphasized the importance of providing quality treatment to vulnerable populations, and stressed that the equipment must be sustainable and profitable as a business.

Dr. Peter Camunyo, a physician, noted that the best judge of quality is the patient, and it is important to gather feedback directly from patients.

Rose Nzyoka, the County Representative for Palladium Kenya  
In an interview with Rose Nzyoka, the County Representative for Palladium Kenya, it was discussed that the organization MESS (Medical Equipment Supply Services) will be introduced to Boris. Additionally, a representative who has experience in setting up Public-Private Partnerships (PPP) will also be introduced to assist in this initiative.

#### Matchmaking conversations

The research findings indicate that matchmaking conversations were held with various companies. The Kenya Medical Practitioners Dentist Council expressed interest in organizing a seminar to discuss potential collaboration opportunities. AAR Hospital, a private full-profit Level 5 hospital, expressed interest in working with the initiative, with a focus on providing assistance to mission hospitals that may not be able to afford high-quality equipment. Additionally, smaller clinics were also identified as potential partners. The research found that the equipment should be offered in sets and that there is a significant amount of knowledge and experience in Uganda and South Sudan.

The Upper Hill Medical Center, represented by Maurice Ubamba, expressed a need for equipment sets and stated that, provided that the price and quality were favorable, refurbished equipment would not be an issue. However, it was noted that the warranty of the equipment should be investigated. They also indicated that they would like to know the origin of the equipment and would be open to discussing potential shipments.

The research also found that M-Healthcare, represented by Jerrioth Wassiki, was not a suitable match for this initiative. There were also many conversations with potential partners in Uganda and could provide introductions to relevant contacts.

Overall, the research found that the main objective of the day was to build relationships and network with potential partners. Each conversation was a step towards achieving this goal.

#### Day 5 Trade mission day 2

The second day of the trade mission included conversations with various healthcare organizations in Kenya. The research found that Amref Health, which comprises the Flying Doctors (an airline

company), Amref University and Amref Health, is primarily involved in linking parties together and does not handle procurement. They suggested that the focus should be on the Kenya Health Federation, Penda Health (which operates 17 clinics), faith-based hospitals, and the Kenya Private Sector Alliance, as well as seeking out local partners who can assist with distribution and import.

Mediheal Hospitals, which performs 50 hip and knee replacements annually, expressed interest in the initiative but suggested that Boris schedule a meeting to discuss further and provide a complete profile portfolio. They also mentioned that they would need to check if there is a market for the equipment within their hospital.

The Kenya Organization of Private Hospitals, represented by Eliza, encompasses Level 1 to Level 5 hospitals and there is a market for the equipment. The organization also raised questions about pricing and availability, and included members who are the heads of these hospitals. There will be a two-day event next week where I can attend, and they also provided a contact for a distributor. I was asked to send a brochure.

The General Secretary of CHAK, Dr. Samuel Muenda, who represents Christian faith-based hospitals, expressed interest in surgical sets, delivery sets, examination sets, and family planning kits. He also expressed interest in implants but emphasized the importance of quality control in order to clear customs. He also requested information about transportation, import costs, and expected shipment dates.

The President of the Medical Student Association, Dr. Zebedy XXX, stated that they work closely with private sector hospitals and would like to link partners with the initiative. They also work closely with organizations such as the Kenya Medical Association, Practitioners and Dentist Union, and the Kenya Hospital Association. They also organize events and suggested attending an event from December 16th to December 20th. They also suggested linking with a plastic surgeon who may be interested in the equipment.

The North Coast Medical College, represented by Marianne Darwinkel, operates as a training college and works with other hospitals. They are a non-profit organization supported by overhead costs and are located in Kilifi County with a population of around 250,000. They expressed interest in using reused hospitals but noted that Level 1, 2 and 3 hospitals are required to purchase from Kemsco, which can offer the best prices. They also discussed the challenges with import and the importance of working with others who are doing similar things. They expressed interest in

theatre equipment, specifically minor theatre equipment for minor treatments and major theatre equipment for larger surgeries.

#### Day 6 Trade mission day 3

The third day of the trade mission included conversations with various healthcare organizations in Kenya. The research found that Penda Health, which comprises 19 private health branches in 3 counties, is in need of basic equipment and can use any help they can get. The CMO, Robert Corrom, stated that he had to send a personal message with information about the equipment available. They also mentioned that only 15% of Kenyans have insurance and the rest rely on paying out of pocket.

Enya, represented by Delft Imaging, develops baby scanners and has experience with startups in other countries. They suggested reaching out to NGO's in the Netherlands for examples and named KIT (Koninklijke Instituut Tropical Medicine) as an organization that could help with contacts and may have distribution processes for equipment. They also suggested reaching out to the Lionheart Foundation and IDA, and Sigma Squared, which nominates young entrepreneurs to support each other.

RFH Healthcare, represented by a successful Kenyan entrepreneur who has received multiple awards, including the Quality Healthcare Kenya awards, expressed interest in becoming an advisor for the initiative. They also suggested reaching out to Dr Jone Kinjanui for further discussions. They emphasized that reusable equipment is acceptable as long as it is of good quality.

Dr Khan from Mombasa stated that they have limited funds but that it would be a good place for impact. Willem van Prooijen, a task force healthcare coach, emphasized the importance of having a local presence and suggested setting up a local BV and potentially becoming a shareholder. He also offered to assist with any questions that arise.

#### Day 7 Trade mission day 4

There is a need for complex medical equipment repair in Kenya, specifically in the area of 3D printing of equipment parts that are not readily available. John Gershanson, an American entrepreneur working in this field, expressed interest in collaborating with the research team by providing knowledge and contacts in exchange for equipment shipments and co-financing with local hospitals.

Additionally, there is a new law in the process of being implemented in Kenya that holds importers of medical equipment responsible for the maintenance and repair of said equipment,

including disposables and larger goods. Robert Gharanya, a contact in the Pharmacy and Poisons Board (PPB), will be able to assist in obtaining clearance for equipment imports and provide information on the progress of this law.

Nathalie Houben, a Dutch national living in Kenya for 25 years and a representative of Pharmaccess, has offered to connect the research team with Dr. Ganda, a key figure in the healthcare industry, and aid in scheduling meetings.

Len de Jong, another member of the trade mission, has also expressed interest in collaborating as an advisor, with a focus on hospital construction and purchasing from large companies such as Philips. Joris van Bommel, Vice Ambassador of the Netherlands in Kenya, highlighted the importance of maintaining personal connections in order to ensure the success of business ventures in the country.

Furthermore, the research team identified potential partners and resources, such as Red Gereedschap, a Dutch organization that collects and ships tools to Africa, and Close the Gap, a Belgian company that does the same with electronics. The team also visited the Railway Healthcenter, a level 2 or 3 hospital in need of equipment and resources, and had a meeting with the governor of Kisumu and the CEO of Open Fences.

#### Day 10 & 11 Doeke Hekstra

During a lunch meeting with Doeke Hekstra, connections were established with Manosh Sha, a former monopolist in the tire industry in Kenya. Mr. Sha has since established the MP Shaw company and the Lions Eyesight hospital, as well as a Lions organization in Kenya. Introduction was made to Shilen Taker, the head of Crown Health, which supplies all necessary equipment for hospitals. Mr. Taker referred the researcher to the head of marketing and expressed interest in collaborating on a charity project, with 2% of the company's profits to be directed towards charity. Further connections were made through Anish, who holds a higher position in the Freemasonry and suggested that the Dutch Embassy could aid in importing goods under the guise of humanitarian aid.

#### Noblestride Capital

Subsequently, the researcher met with Nobelstride Capital, who were introduced through RFH healthcare, a hospital in their portfolio. Martin Othienna, healthcare specialist, and Evans Wesonga, managing director, expressed interest in setting up a pilot project. This would involve sharing a catalog with approximately 3 hospitals and requesting lists of necessary

equipment, followed by offering a price and finalizing payment and shipment arrangements. The goal is to attain clearance for these shipments and, if successful, to establish a partnership. This could potentially include opening an office in Kenya, where equipment could be demonstrated, and a commission or increased pricing could be negotiated. However, it was noted that public hospitals should be avoided due to the lengthy payment process and potential reselling of equipment.

#### Day 12 Upperhill Medical Center

The Upperhill Medical Center, led by Maurice, is a facility that performs surgeries and recognizes the value of high-quality instruments. The center currently uses a few suppliers based in Nairobi for their instrument needs. The current process for ordering instruments involves sending a catalog, receiving a price quote, discussing internally, and then making a payment if approved by the decision-making authorities. The center typically orders standard sets, but also looks into specific sets based on their areas of expertise. Recommended sets for small setup hospitals include a suture set, a minor set, a plastic set, a Delition & Craddige (D&C) set, a spongeholder, a needleholder, straight/cutting scissors, section tissue scissors, section forceps, tooth and non-tooth dissection forceps, two gally pots, and two kidney dishes. They prefer to order in shilling and the next round of purchasing is expected to happen in February or March when capital expenses are approved. The center does not sharpen scissors as it causes them to become dull faster. They also plan to look into 2 in 1 sets/tancil sets in future. The center would like to see the instruments before ordering, and was pleased with the quality of the items presented.

#### CHAK (Christain Health Association Kenya)

The Christian Health Association of Kenya (CHAK) operates a chain of mission hospitals. During a meeting with the head of health, it was highlighted that there is currently a significant need for medical equipment within their organization. The two most important factors for equipment are reliability and affordability. The organization also expressed interest in implants and will be investigating the possibility of utilizing them. CHAK can assist with distribution, as they have an agent for this purpose. A catalog was provided and they will be informing on areas of interest. Additionally, a pre-shipment inspection will be conducted in the Netherlands to determine the conditions and requirements for equipment. Overall, the meeting emphasized the importance of finding reliable and affordable medical equipment for CHAK's mission hospitals, and exploring potential partnerships and solutions for distribution and inspection.

#### Day 15 St. Jairus Hospital (Kisumu) - Dr. Jack CEO

Then, Steven Gwer, a doctor, and I went out. He has a business, works on the second half with Karl-Heinz Semenjo, has connections to JC, and is well-connected in the medical community in Kisumu. First, we visited Saint Jairus, a private hospital that is about level 4. They also perform surgery here, and doctor Gwer actually claimed that private hospitals don't maintain levels very well and that something else is at work there.

Therefore, patients are placed in a level four hospital if they undergo surgery. Dr. Jack, the CEO there, and I had come to an understanding. We got to the discussion when disposal instruments are not used anymore. What exactly is the lower limit? He asserts that it can still be utilized as long as it is placed in the autoclave. Is it for our equipment, which is employed in the processes? I don't care if it's brand-new or throwaway. As long as it works, it's good and we'll also continue to use it until it's no longer functioning or something like that, so I responded, "Okay, then what happens after that? If you respond: "Okay, it's broken; we don't really have a system for it." If a pair of scissors is blunt, it will still be in the set in the operating room because it simply stays in circulation. These scissors are still in the pair that the surgeon's helper prepared. The first set of scissors, though, won't be the one to tell the surgeon. There is currently no system in place to dispose of that stuff. In the Netherlands, we do have a system that essentially goes through all of your assets to determine what is still appropriate and what is not.

He's eager to make use of our disposable instruments." He honestly thought our disposables were excellent when I showed him. Yes, we can only use this once, he says, adding that in his opinion, doing so would be absurd. We'll just keep using this till it breaks. I responded, "Well, we can provide quite a bit of this stuff, but then we have to consider what happens to all that metal, which will be left over afterwards." If those tools go down, we will need to create such a system. Dr. Gwer then had the bright idea of working with a scrap metal disposal business. There are many of them in Kisumu, and some men operate on a small scale that they will only purchase a pair of scissors or a spoon from you, so that may be something to take into account to create a more circular lifecycle.

They mostly purchase from Harleys, which is Kisumu's main supplier of medical supplies. In his hospital, he estimates that a pair of scissors will endure for around two years. He wouldn't mind utilizing repurposed instruments as long as our quality control is strong, which may be occasionally about three years and 1000 cycles. It's noteworthy to note that in Kisumu's biggest hospital if a



person breaks a bone there, a plate is placed on their body, screws are inserted, and the plate is withdrawn once the bone has healed. The plate is then placed in an autoclave before being used once more on a different patient.

He said that implants have no expiration date, therefore he was very curious when I showed him the implant. He doesn't comprehend the Dutch practice of discarding items like these. Look at us, we're a little perplexed as to why this has an expiration date. You do realize that it is metal? It's possible that the legislation hasn't yet adequately stated this. Therefore, it's possible that doing so is still allowed. Additionally, according to doctor Gwer, if something is not prohibited, you can determine whether it is acceptable. That was fascinating to me. Therefore, it's possible that there aren't any regulations in place for this, which would allow us to discover a way to get it into the country. That is undoubtedly the largest challenge because, yes, you must repackage or re-sterilize your product before repackaging it with a new date or no date at all because it must still cross the border.

He also mentioned that three significant procedures were being performed. Obstetrics and C-sections come in first, followed by general surgery, laparoscopies, and appendices, and then orthopedics and trauma. I gave him two disposable and two reusable instruments, and he will be in touch with me for a while to let me know how things go with his circulation, how often the instruments break, how things go with the surgeons, and especially how long the disposables last in the system.

What type of chemicals are utilized to clean the instruments was another crucial topic we covered. Naturally, they are placed in autoclaves, but the metals are also cleaned using certain chemicals. Some contain compounds that are more aggressive toward the metal, hastening its decomposition. In order to make your instrument live longer, we could advise you, "I would recommend or advise against a certain chemical." Additionally, it would be profitable to sell or at the very least refer chemicals. I might research the various sterilization methods used in West Africa. What exactly are those steps, and how might they vary from hospital to hospital? How does that affect the instruments, then?

Tayiba Medical Center (Kisumu) - Maryam Abdul Maya, manager of clinical operations

We went to Tayiba Medical Center. Then after, we talked to Maryam Abdul Maya, manager of clinical operations. When do you write off instruments, I questioned her. If something is rusting, she declared,

it is finished. When it breaks, we stop using it, and eventually, it ends up with a waste management organization that is also a part of Kisumu's biggest hospital (JOOTRH), and they organize that.

They place a high priority on four things. The first is quality. It must be sturdy and made of stainless steel. Affordability is the second factor. Third on the list is accessibility, so if something breaks, it should be swiftly and readily changed. The fourth factor is maintenance; it should be simple to maintain and simple to autoclave.

They clean their instruments with conventional chemicals. This substance is sodium hypochlorite, also known as JIG.

She was intrigued by the implant but was wary because they had been declared useless in the Netherlands, which made her wonder if they were still secure. She responded, "I'd want them, but they have to be safe." So, absolutely, we want them if you can convince me that they are just as safe as those in Kenya or brand-new ones. And they added that the majority of Kenyan hospitals employ individuals to deliver implants when patients require them. So imagine someone needs a new hip, then a man with several sizes of hips comes over. He approaches the patient, who responds, "Okay, you must have this size," before moving away once more. The procedure is then carried out. With the exception of specialist institutions and maybe the largest hospital of all, such as JOOTRH, the hips are therefore not so much sold to the hospitals as to the guys who carry them.

She wants to do a pilot using her disposables with us. Then we may send it to her and she will give feedback. Its main supplier is Crown Healthcare I also spoke with the CEO of Crown, who put me in touch with the marketing director. They might desire to take action to further a worthy cause. As a result, I'm still waiting for an answer before we can start up such a campaign. Maryam wants what we have. Only we must be able to demonstrate that our products are of a greater caliber than those of Crown. Pakistan is where Crown purchases its instruments. Maryam stated that taxes must be paid at the border even for donations to a hospital. We might contact the Red Cross for assistance with this.

The market for our second-hand surgical instrument is probably not going to be substantial or at least scalable, and the market would mostly be in new instruments. I believe that now is a good time to include NGOs in our projects. So I believe it's interesting that we start talking to NGOs about starting to donate. So just a conclusion: Maryam would like to perform a pilot with us. She is interested in implants and we may provide her with a kit. So we just have to

prove that there is greater quality and that it is safe.

Peter - Orthopedic Surgeon

We were able to speak with the orthopedic surgeon who brings implants to hospitals, also known as the implant guy. I displayed the hip implant to him. That was only one piece of what was supposed to be a whole set. He remarked, "Well, I'm selling this item, it costs 80000 chilling, so that's about 632 euros," after taking a good look at that hip. He added that an implant is permanent in Kenya. Therefore, there is no time limit. We calculated that there would be 1000 implants available. The total price of Unifix Care inventory is then almost 632,000 euros. More than half a million euros in potential value.

Since everyone I talk to is interested in those implants, I believe that this is Unifix Care's first opportunity at the present. To get it into Kenya, all we need to do is find out how to put a fresh quality mark or expired ad on it. We have a lot of potential to add value for the locals once it enters Kenya. perhaps it could be worthwhile to transfer a container from the Netherlands to Kenya worth 100,000 euros. We, therefore, need to investigate this more.

I made Peter get confident by conducting business with him. We must determine what steps must be taken in order to import that merchandise. Since we run a respectable business, I believe he will also search for us. He added that he has observed the usage of disposables during procedures at the hospital in Kijabe, which is close to Nairobi. He answered, "Yes, well, I've seen those, they're just been used numerous times in the operating room," after seeing the blue-tipped scissors I showed him. He added that a container containing those disposables had been shipped from Australia. This kind of initiative has so occurred before.

Railway Health Dispensary - Dr. Victoria

Then I returned to the hospital where I had spent the previous week on a business expedition. The extremely corroded instruments were at the Railway Health Dispensary, where I took images of them. When they saw me again, they were ecstatic. They were thrilled when I aimed to replace as many of their instruments as I could with items in the case. They thought our logo was extremely attractive, so she quickly changed it to her profile photo. I also said: "Suppose you still need something, let me know."

Kisumu specialist hospital - Dr. Bitta Cesar (CEO)

I then traveled to a specialist hospital in Kisumu. This is specialized,

for citizens with greater incomes, the hospital was excellent and seemed more modern, a bit more professional. Dr. Bitta Cesar, the boss, and I had a talk. I asked him about the implants and he mentioned that he is an example of a hospital that does pay attention to expiration dates. Even if it is less rigorous than the Netherlands in this regard. I believe it is already charged in the Netherlands six months before expiration. If it is slightly overdate, he doesn't mind as much to still use it. He adheres to European laws rather less strictly. He had traveled to Europe a lot and was clearly a very intelligent man.

He responds that you do have a market if you can demonstrate that the quality of the implants you currently possess is the same as it was five years ago. You need to be able to back that up. He mentioned a US company that dealt with surgical equipment, so the man went in search of it. I don't really care if an instrument has a second life, he declared. Even if they were used, I would still buy from you and purchase your goods. Only, I need your assurance of my caliber. My top priority is Warranty. It is common to provide me with a one-year warranty after making a three-year performance guarantee for this product. Once we agree and the instruments have a year warranty, I can be certain that I will have decent instruments for that time period and that they will last because of the warranty. I'll take it for granted that the instruments will last even three years. If you pledge to do this, be sure to at least have a backup set of instruments available close to the hospitals so you won't need to transport it from the Netherlands.

PPB

He also provides a rough explanation of how the ppb functions. You must bring a set, such as an example set, to the PPB if we wish to export the products to Kenya. They'll determine if it complies with the requirements. If that is not the case, they offer comments and follow it up with the statement, "Yes, this needs improvement." They will next randomly examine portions of your shipment by opening things and checking if everything works, after which they will say: now it's good and instruct you to import the remaining portion of your shipment in accordance with these requirements. Since this organization is exempt from the law, PPB has the final say in whether it succeeds or fails. They have the authority to make choices for which there are no written laws. Can they still express their opinion that something is excellent enough or not good enough? The same holds true for the opposite situation. They are the controlling body that we must persuade to allow our instruments into the country if laws have been written about it and they might also say: this is fine, this can enter the country. It's important to approach this delicately.

Dr. Ganda

Meeting with the minister of health, Dr. Ganda, on day eighteen in Kisumu. He holds that technical/financial position in addition to being the chief officer of health, which is his political post. I informed him that we had implants, reusables, and disposables. Both of these must pass through customs. He claimed that is done either through the PPB or the Nursing Counsel. You cannot do it yourself, as the story's end stated. You need assistance with that, with finance, with distribution, with whatever.

He clarified that they place all of their orders through prequalified contractors, not KEMSA as I had assumed, but rather with organizations that have established themselves as legitimate organizations authorized to transport goods to Kisumu County. An application is then required from each party. So it's probable that the county will issue a call for bids. That is a list of the items they require, in order. After that, all parties and contractors can submit applications with quotes. We won't be able to become a pre-qualified contractor right away; it will take time. Only those prequalified contractors may be asked for work by Kisumu County. We have to work with a pre-qualified contractor. Finding a partner who is a pre-qualified contractor is necessary. Alternatively, we must cooperate with a different kind of party. Consider an NGO as an illustration. Even if it takes a lot of time, we can also submit an application ourselves.

Doctor Ganda can provide me with a list of for-profit businesses that are permitted to ship their equipment, but he essentially explained that what happens is that they will likely demand a markup. Therefore, even if we provide it to them for one euro each, there's a good likelihood that they'll resell it for two or three times the price, which goes against our ideals. We don't want it to happen because it would negate the impact we are trying to achieve. These prices should not increase at all. That is our main motivation for doing this. Because of this, you ought to speak with an NGO. K-MET is an NGO that Kisumu County collaborates with.

So in the afternoon, I travel there. At the border, you always pay a 16 percent tax. As a result, if we cooperate with the county, it's possible that the county will pay the taxes in full before they cross the border. They merely require the list, which we deliver to them. A company called Surgipharm imports medical equipment tax-free. They have a sign-nail for that tax and that unique thing. They coordinate US donations, and if you own one of these sign nails, you are exempt from paying taxes. I received a number from that, which I don't have time to call right now, but it could be interesting to do

so in the future.

We discussed the implant. He claims that implants must adhere to certain requirements. If such an implant still passes such standards after five years, you can check the manufacturer. And if that's no longer the case, please make the necessary corrections. For instance, if the intervention is modest, it simply needs to be recertified, it now fulfills the value, and you can create a record of it to send back to Kenya. With that, he might be able to cross the border. The same will apply to the European Union. What is the deficit after five years?

Bloom surgical - Dr. Gwer (Surgeon) & Abass (The administrator)  
After that, we visited Bloom Surgical. Doctor Gwer also works at that hospital, and they informed us that all of their supplies come from Nairobi. That Kisumu's trade supply is still not very good. Everything basically passes through Nairobi. Harleys Limited also serves as one of their suppliers. The hospital Saint Jairas uses the same supplier. The fourth person, i.e., someone from the surgery room, notes what is lacking, asks the pharmacy assistant for it, and he or she gives it to Abass (the administrator). I spoke with him, the man who actually handled everything there, and he said he could handle a modest order, like a few scissors, for instance. A huge order is what? He omitted to provide a number. However, if a small order is five scissors, a large order will be 50 scissors. On WhatsApp, suppliers provide their quotes. He therefore communicates with them on Whatsapp as well. He claimed that Pakistan was the source of everything. All surgical equipment is made of stainless steel and is imported from Pakistan. He is of Pakistani descent, and he stated that there are various standards in Pakistani words, such as first quality, second quality, and sometimes third quality: Brands don't mean much because you may even have your own name written on something. There are varied qualities even within one brand, therefore you need to be aware of first quality and second quality.

They frequently place orders from Medi Globe in Nairobi because it is recommended by one of their directors, therefore it is convenient for them. He also cited Sialkot, which is where all the instruments are made and produced in Pakistan. You should have at least three to five quotes before a hospital agrees to a price on its list, which they then transmit to vendors, for example. Requesting a minimum of three to five quotations is typical procedure number three.

I made him take another look at the platform. That didn't seem important to him. I don't need that at all, he reasoned. What purpose does this serve? I asked, "Look at it; tell me what you think." glance at the data. He then noticed the forceps, but there was

insufficient detail there. He was interested in the sort, whether it had teeth or not, and if it was straight or curved. What curvature, if any? Moreover, he informed me that the rates of every vendor are listed on the internet. However, the quote you receive when you request a price is never the same as the final price listed on the website. So they fiddle and adjust that. Therefore, to him, the price listed on the internet didn't mean much. Therefore, he suggested that you include a feature that would allow customers to request quotes via your website or fill out a form before receiving one. That would have been more helpful to him than this. Yes, samples should be possible to bring.

A local purchase order is an LPO. Orders are usually referred to by that phrase. Additionally, if you have a local purchase order, the vendor may say, "We can offer that at this price," when the buyer sends out a list of items. Then he replies, "Alright, we'll do that." You then have a local purchase order, which you confirm after seeing the products but before confirming the order for the product. Following the delivery of samples, you must confirm the products, and only then can an agreement be made. That's how he operates.

Everything is based in Nairobi, he said again, therefore everything originates there. In Kisumu, the supply of Trade is insufficient, making it very expensive. I simply purchase them in Nairobi and have them deliver them here. Buy from Medi Globe right now. They began with supplies and equipment and now do everything. Additionally, he said that in three years, we had only placed one order for instruments totaling about 50,000 shillings, or about 400 euros. The instruments they have been using since the beginning—more than three years—so they have been in operation. As of three years ago, the hospital was built. They only have two surgery rooms and maybe 30 beds total. Every day, purchases of medications are made.

What their precise cleaning procedures are and how they clean that: They utilize the pill version of JIG preset to disinfect. Because it's possible for those scissors and other tools to be misused, it's imperative that you have qualified individuals dispose of these kinds of instruments. If someone finds such scissors, they might take them and sell them again. So you really don't want that. Because of this, they also have several colored bags that they use to store their medical trash, such as a red-orange bag that is intended for incineration. These are items that should never be in the hands of others and they are destroyed. They are therefore paid to do that as well. To properly describe our focus, let's say that it will primarily be on private hospitals without a tendering system. So you do have a contractor when using the tender method. We are not

qualified contractors. Actually, you want Unifix Care to be an option for the hospital to choose from when placing orders. We need to have a look at the Kenyan procurement act. The ISO International Standard Organization is available to you. That occurs everywhere. Ivan will likely be aware of that as well.

Theater Tour. The steps that instruments go through are as follows: they are removed from the theater. The dirty objects are then brought to the sink, rinsed there, and placed in a Dozine Bath for 45 minutes. It is then washed in clean water, dried on a towel, and brought to the stage room where everything is examined. Everything that is damaged or needs to be replaced is examined after the set has been put back together. Broken items are placed in a different bin. Then a list of what needs to be new is created. If you have a complete list complete set once more, it is placed in the autoclave and after it is finished, it is placed in the rack and stored so that it can be taken right away if there is an operation. It is then sterile. The findings from research conducted indicate that the most commonly performed operation at Boom Surgical is a cesarian section, and as a result, a set of necessary instruments, including a cesarian section and hysterectomy set, are required.

#### K-MET

K-MET was visited, a non-governmental organization (NGO), and found that they were interested in collaborating with Kisumu County. The author noted that when speaking with important individuals, such as the minister, the level of engagement and interest in the topic increases. In this case, K-MET immediately took the proposal for collaboration with Unifix Care seriously. The author identified five key points that need to be addressed in order for the collaboration to be successful. These include determining prices for the instruments, obtaining a letter of authorization as a local distributor, obtaining a letter of authorization for instrument suitability for use and import in Kenya, having a protocol for sterilization, and addressing the operational costs for the NGO. K-MET has 2000 facilities in Kenya, and the author will be obtaining more information on the number of operations that are performed at these facilities. The author and K-MET will be working on a letter of agreement to become partners and outlining the responsibilities of each party. The focus for the moment is on addressing the five key points identified.

#### Kakamega

##### St. Elizabeth Hospital

The findings from a field research conducted by the author indicate that upon arrival in Kakamega, the author accompanied Alex, an employee of Healthy Entrepreneurs, to St. Elizabeth Hospital. The

hospital is a level 4 faith-based Catholic hospital with approximately 240 beds. It is not affiliated with K-MET or CHAK (Christian Health Association of Kenya), but rather with the Catholic Conference of Bishops (CCB). The author notes that the hospital does not receive much support from this organization.

During the visit, the author had a lengthy conversation with a sister, who is a traditional religious sister, and observed the hospital's sterilization processes. The author was shown the general surgical instrument set and was surprised by the number of instruments it contained. The author then asked how many of these instruments are actually used during a surgery, and was told that only about half of them are used regularly. This confirms the observations made at St. Jairas Hospital in Kisumu, where the author had previously learned that there is no system in place to check and discard expired or damaged instruments.

The author also asked about the procedure for ordering new surgical instruments, but this question was met with resistance from the sister, who felt that the question was irrelevant and became suspicious of the author's intentions. The author and Alex felt that the sister thought that they had bad intentions.

#### Lukanji Community Hospital - Kakamega

After visiting a clinic, a warm reception was received. The clinic was a level three dispensary and is supported by an NGO organization called Local Community's Against Poverty. They are focused on education and empowering women, with a significant emphasis on quality healthcare and subsidies. The representative of the clinic mentioned that they needed an incubator for the maternity room and when asked about the procurement process, it was revealed that they typically research and compare prices online and that price is a significant factor in their purchasing decisions. They had previously purchased items from a company called Medi Leads Kisumu, who provides both new and second-life instruments and equipment. However, they had a negative experience with a previous delivery from Medi Leads, as it was found to have rust on the kidney bowl, which required them to return the item. The clinic primarily performs cesarean sections and circumcisions. The catalog was shared and the representative highlighted the specific instruments that they needed.

#### Kisumu > Mombasa

On the 20th, in the morning, the writer departed from Kakamega and flew to Kisumu, subsequently continuing to Mombasa, arriving in the late afternoon. The writer then had a conversation with their supervisor regarding their thesis and presented a new direction.

This interaction proved to be valuable as it was discovered that the initial task of designing a classification model for surgical instruments was not relevant to the context in which they were working. Instead, the writer has chosen to develop a business model for three different types of products: disposable, reusable, and implants. Each product type has different stakeholders involved and requires a distinct financial model. The ultimate goal is to create three business models that will provide insight into profitability and potential challenges.

KRA

See figure flowchart

#### NCMTC Marianne Darwinkel

It was found during the course of our research on the 21st day, Thursday, that there is a need to thoroughly investigate the legality of selling used medical equipment to the government in Kisumu County. The Minister of Health in Kisumu County expressed willingness to acquire such equipment, but it was noted that there may be other parties that could potentially impede the process. I also met with Marianne Darwinkel of North Coast Medical Training College, who provided information about the county system in Kilifi County. Kilifi County is the poorest county in Kenya, and the hierarchy of the system includes the Minister of Health at the top, followed by the Director of Health for Kilifi County, the Chief Officer of Health, sub-counties, and finally, the head of primary healthcare. The researcher mainly focused on Kilifi South and the head of primary healthcare is Dr. Hassan.

Marianne also highlighted that equipment deteriorates quickly in coastal areas, and that Mombasa Surgical Supplies is a well-established supplier of medical equipment for both the government and private hospitals in Kilifi County. She also suggested that if the researcher is curious about the prices of products, inquiring directly with manufacturers would provide more accurate and timely information. Mombasa surgical supplies is a better supplier than crown, and it is one of the parties that researcher had heard of before. It should also be noted that some suppliers may charge a small fee for quote requests, as these are frequently requested.

During the course of our research, it was found that there is an opportunity to collaborate with a workshop run by three student mentors at a local college. The workshop is a two-week program that aims to provide practical training in entrepreneurship for students. The mentors reported that some students become

so engaged in the workshop that they continue working on the project in their free time, potentially extending the duration of the project to up to a year. The participants include students studying engineering, nursing, and nutrition diets. The idea discussed during the meeting was to provide the students with 10-15 identical sets of medical equipment and task them with selling the equipment to institutions and presenting a business plan. The student who presents the best business plan would be rewarded with a potential internship opportunity with our organization. The region has a high unemployment rate and providing job opportunities for these students would be a valuable reward. The mentors were enthusiastic about this idea and it was agreed to discuss further details in the future. The researcher also obtained the contact information of the Medical Superintendent and Hospital in Charge, Dr. Mabruk.

#### Mtwapa Sub County Hospital

During the visit to Mtwapa Sub County Hospital, it was revealed that the hospital is currently at level three/four and is in the process of expanding. A new three-story building is being constructed to accommodate additional operations. However, the facility is currently empty with no beds or equipment. The hospital provided a list of necessary equipment, including surgical instruments. Doctor Sultan is the primary contact at the hospital and could potentially assist with payment for the equipment. Additionally, the medical superintendent and hospital in charge, Doctor Mabruk, would also play a role in the approval and distribution of the equipment within the facility. The hospital was not familiar with the NGO K-MET and currently works with another organization that supplies equipment on a sporadic basis. The researcher also investigated potential collaborations with other parties to assist with distribution and decrease costs. Aga Khan Hospital was also suggested as a potential collaborator.

#### Ganjoni Private Hospital

During the course of our research, we visited the Ganjoni Private Hospital in Mombasa. The meeting with hospital staff was productive, as they provided us with a list of sets they required and detailed specifications of their needs. Our organization was able to determine what we could provide in response to their needs. The hospital does not currently have any partnerships with other NGOs, and staff were unable to provide information about the source of their current equipment. Further inquiries will be made via email to gain a better understanding of our new platform.

#### Khairat Hospital

We also visited the Khairat Hospital and met with Dr. Abu Bacar. The hospital places a strong emphasis on charity, and they provide monthly treatment for 150 older adults and a significant number of orphans at no cost. However, it should be noted that the statistics provided by Dr. Bacar should be further verified. The hospital also provided a list of instruments they require and we have informed them of what we can supply. They also expressed interest in the inplant and have an orthopedic building in addition to their main hospital, which could be a potential area of collaboration. The hospital staff also mentioned their outreach programs to remote areas in order to provide impact. Overall, Khairat hospital was the last one we visited and we have already provided other materials to other hospitals. We had a few inplants and materials left that we could provide to this hospital as well.

Findings about the importance of second-life instruments:

#### Thijs van Hees

Expiry date is important for eadrops. This used to be different 10 years ago. They were easier accepted. Now the mindset has changed.

Upper Hill Medical Centre - Dr. Maurice Ubamba: Second-life is no problem. Price, quality and warranty are most important

RFH Healthcare - Dr. Jone Kinjanui: Emphasized that reusable equipment is acceptable as long as it is of good quality.

Railway Health Dispensary - Dr. Victoria (CMD): The rusted surgical instruments have been replaced by the second-life surgical instruments of Unifix Care brought by me.

#### St. Jairus Hospital (Kisumu) - Dr. Jack CEO:

I don't care if it's brand-new or throwaway. As long as the instrument works, it's good and we'll also continue to use it. He asserts that it can still be utilized as long as it is placed in the autoclave.

There is currently no system in place to dispose. If a pair of scissors is blunt, it will still be in the set in the operating room, it simply stays in circulation.

He honestly thought our used disposables were excellent when I showed him.

We'll just keep using instruments till it breaks.

Wouldn't mind utilizing repurposed instruments as long as our quality control is strong.

Implants are being reused in JOOTRH. After surgery, these implants get cleaned and used again on another patient.  
implants have no expiration date in Kenya.

Peter - Orthopedic Surgeon: He added that a container containing disposables had been shipped from Australia into Kenya for reuse.

Kisumu specialist hospital - Dr. Bitta Cesar (CEO): I don't really care if an instrument has a second life, he declared. Even if they were used, I would still buy from you and purchase Unifix Care goods.

Dr. Ganda - Minister of Health Kisumu County / chief officer of health: He claims that implants must adhere to certain requirements. If such an implant still passes such standards after five years you can get a new validation at the manufacturer. And if that's no longer the case, please make the necessary corrections.

Bloom surgical - Dr. Gwer (Surgeon) & Abass (The administrator): in three years, we had only placed one order for instruments totaling about 50,000 chilling, or about 400 euros. The instruments they have been using since the beginning.

St. Elizabeth Hospital: I was shown the general surgical instrument set and was surprised by the number of instruments it contained. only about half of them are used regularly. there is no system in place to check and discard expired or damaged instruments.

Lukanji Community Hospital: negative experience with a previous second-hand delivery from Medi Leads, as it was found to have rust on the kidney bowl, which required them to return the item.

# D

## Stakeholders

1. Ministry of Health (MOH): Lead healthcare policy setting government institution in Kenya.
2. Pharmacy and Poisons Board (PPB): Regulatory body for registration of medical devices under the Department of Medical Services at the MOH.
3. Kenya Bureau of Standards (KEBS): Regulates quality standards and technical regulations for eHealth and medical devices in Kenya.
4. Certificate of Conformity (CoC): Required for customs clearance of imported eHealth and medical devices in Kenya.
5. Kenya National Single Window Electronic (Kentrade) System: Platform for obtaining import permits for medical devices in Kenya.
6. Public sector: 46% of healthcare facilities in Kenya, 43.8% market share of medical devices. Sources medical equipment through Kenya Medical Supplies Authority (KEMSA). Regarded as a price-sensitive market. (source)
7. Private sector: 40% of healthcare facilities in Kenya, 39.0% market share of medical devices. (source)
8. Faith Based Organisations (FBOs): 14% of healthcare facilities in Kenya, 17.2% market share of medical devices. Not-for-profit organizations that provide 40% of all commercial private healthcare needs. (source)
9. Managed Equipment Services (MES): Government program to equip higher-level public facilities.
10. County Governments: 47 county governments responsible for health service delivery under devolution, with policy and regulatory functions retained by the national government.
11. Civil Society Organizations (CSOs): Not-for-profit organizations advocating for improved health outcomes, access to care and health services, and representation of marginalized communities.
12. International Donors: Provide financial and technical assistance to support healthcare development programs in Kenya.
13. Medical Device Suppliers: Provide medical devices and eHealth solutions to healthcare facilities in Kenya.
14. Healthcare Practitioners: Include doctors, nurses, and other medical professionals who provide direct healthcare services to patients.



# E

## Interview Orthopedic surgeon

Dr. Vroemen, conducted in Breda 2023

To promise the safety of a surgical implant, expiry dates are included with implants. This means an implant has to be used within 5 years of production. Protocol in the Netherlands is that 6 months prior to this expiry date, the manufacturer is not allowed to use the implant anymore. Jos Vroemen explains that three reasons play a role why implants have an expiry date:

Mechanical aspect

Ethical aspect (not covered by this research)

Infectious aspect

Mechanical

Implants that are reused can fail under repetitive load due to metal fatigue. If it is not used, it will have the same strength. The implant will not deteriorate mechanically if it is just sitting in a storage box. It will maintain the same strength and properties.

Vroemen has experience in trauma surgery in Africa and describes the use of the external fixator which is used repeatedly on multiple patients which proves that the metal can last for a long time even under intense use, despite being used outside the body.

Infectious

According to Vroemen, sterilization can also be affected by the packaging, which may no longer provide a sterile barrier after 5 years. He explains that if he finds a perforation in the outer packaging, he is obligated to dispose of the implant. An implant packaging consists of at least 3 layers. This inspection is done visually and is interpretable by the surgeon. There is a high likelihood that the outer layer of the packaging contains micro-perforations that are not visible to the naked eye. In this case, the implant should also be discarded, which may not always happen implies Vroemen.

If it is assumed that expiry of the packaging is the limiting factor, the solution is easy: provide new packaging. Jos thinks that the reason for expiry is primarily due to sterilization. Resterilization should be possible.

Mechanical: Does resterilization lead to loss of mechanical properties?

He indicates that the molecular structure of stainless steel, titanium and vitallium implants does not change and thus not affect the

mechanical performance.

Infectious: How can we resterilize old, unused implants in such a way that there are no infection risks?

Possible problems with resterilization: Jo van Engelen mentions that titanium implant have cavities that can contain bacteria and cannot be removed by sterilization. Jos Vroemen denies this statement, as he implies that bacteria are not present when the implant has never been outside its original intact packaging. Even if the bacteria are present, at high temperatures and pressure, the bacteria will still die, even in the cavities. For a more scientific answer, a bacteriologist needs to be consulted.

A Theatre assistant from AMPHIA that is responsible for material use at the hospital mentions the importance of a serial number on implants. Each implant has a serial number that is registered during surgery. It is very important to know which particular implant went into the patient. In this way, production errors from the manufacturer can productively be solved and see who is liable for potential issues. When resterilizing, this product number needs to be contained.

Based on his 40 years of practical experience as a trauma and orthopedic surgeon in Africa, Jos Vroemen has a strong conviction that the mechanical and infectious safety of an implant remains intact beyond its expiration date. He is of the opinion that even if an implant has been declared non-sterile after 5 years, resterilization is

# F

## Supply analysis

### Introduction

The purpose of this chapter is to assess the feasibility of Unifix Care as a supplier by verifying whether they can adequately supply their products to the Kenyan market, as stated in assumption 3.1. This investigation is crucial because if Unifix Care cannot provide a sufficient supply of products, their ability to add value to the Kenyan healthcare market would be limited. Therefore, an evaluation will be conducted of Unifix Care's current supply chain to determine the adequacy of their product supply. The aim is to gain insight in the sufficiency of the supply for each product category.

### 3.1 The supply of Unifix Care products is adequate

To assess the adequacy of Unifix Care's supply, an internal investigation of their product inventory was conducted. This involved evaluating all products and categorise them while researching the number and percentage of applicable instruments and the amount of time that is required to assemble the final product in order for it to be used.

The process was documented at the Unifix Care office to count all instruments from one batch. The time spent on each step was recorded. This provided valuable insights into making an assessment how many products Unifix Care can deliver.

### Single Use Surgical Instruments

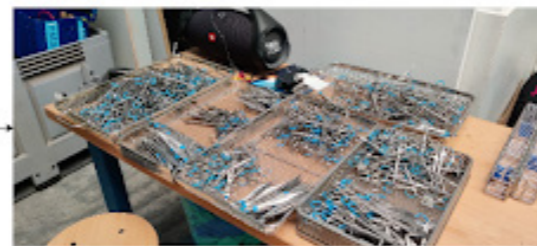
The process of Unifix Care selecting SUSI sets.

### Method

Searching through basket to find usefull instruments at Van Straten Medical (160min)



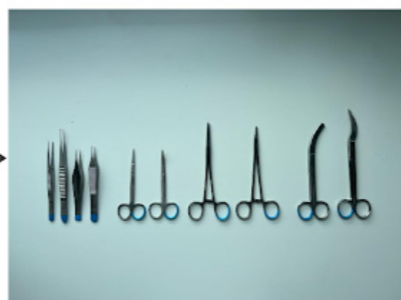
Sorting the instruments on type at Van Straten Medical (20 min)



Package and deliver to office



Counting and composing packages



### Results

Unifix Care supply	Stitching set	Destitching set	25x Mayo-Hegar Needlefeeder 15cm	25x Iris Scissors 11cm - 100,85 euro	Parturition set - 15,15 euro
Lettix Chirurgisch Pincet, 13cm, 1x2 tand, extra fijn	450				
Chirurgisch Pincet, 15cm, 1x2 tand, extra fijn	350	1x Adson pincet 1x2 tanden 12.5cm RVS			
Feilchenfeld Splinter Pincet, 11,5cm	350				
Adson Chirurgisch Pincet, 12cm, extra fijn	450		1 x Anatomisch pincet 11cm (fijn model) recht		
Iris Schaar, 11cm	300	1x Iris schaar spits / spits 11cm recht RVS	1 x Iris schaar spits / spits 11cm recht	25x Iris schaar spits / spits 11cm recht RVS	
Iris en Ligatuur Schaar, 11cm, gebogen	250				
Crile Arterieklem, 16cm, recht	500				2x arterieklemmen Pean 16 cm
Baby Crile-Wood Naaldvoerder, 15cm	400	1x Mayo-Hegar naaldvoerder 15.5cm RVS		25x Mayo-Hegar naaldvoerder 15.5cm RVS	
Bush Navelstreng schaar 16 cm	300				1x Navelstrengschaar Bush 16 cm
Episiotomies schaar 18 cm	350				
Missing items	1x Table cloth 50x50 cm 5x gauze pads 10x10cm		5 x Non Woven gauze pads 7,5x7,5cm		1x table cloth, 75 x 90 cm 1x plastic tray, 196 x 133 x 34 mm 5x gauze pads 10 x 10 cm

None of these sets were able to be fully completed due to the unavailability of some instruments. It appears that there are still several instruments that are not used for this study but could be used. Although it is possible that more SUSI sets exist, we were only able to identify six SUSI sets in Unifix Care's supply that include SUSIs.

Out of the current batch, 316 sets could be assembled. 300 destitching sets and 16 Mayo-Hegar Needlefeeder sets of 25 pieces. An overview of all the potential sets compared to the yearly inventory of Unifix Care is depicted in Figure FIXME. The sets that were composed for this study are highlighted.

To enhance completeness, a flexibility margin of 20mm was introduced during the sorting process. For instance, if forceps measuring 140mm were required, forceps measuring between 120mm and 160mm could be included in the second-life set. Additionally, in the process of creating the set, a Mayo-Hegar Needlefeeder was replaced with a Baby Crile Wood Needlefeeder as they serve a similar purpose and are comparable. Similarly, different types of tweezers were considered, provided that they have the

same type of beak (precision or 1x2).

### Conclusion

**How long does it take to compose each set?**  
 9 hours and 8 minutes to compose 16 complete & 300 incomplete sets (excl. packaging)



First stage (general checks)	Second stage (composing sets)	Third stage (repackaging)
160 minutes sorting at Van Straten 20 minutes second round sorting 20 minutes categorizing at the office 200 minutes = 3 hours and 20 minutes	300 min Densharing set 48 min 25 Mayo Needlefeeder 348 minutes = 5 hour and 48 minutes	X min Buy and add missing elements X min Sterilizing (if necessary) X min Repackaging X min Prepare shipment

In the future these numbers can be improved  
 To cut costs it can be done locally

**How much percent of the excess instruments can be used?**  
 27,02% of instruments of the total batch is used in sets

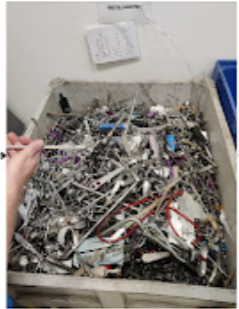


**%**

Total of 3700 instruments  
 3700 useful instruments  
 1000 items are used in 4 surgical sets  
 $(1000/3700) \times 100\% = 27.02\%$  used in sets from total batch  
 Doubling the time spent would result in an estimated 150% more used instruments from the useful instruments!

### Reusable Instruments

The process of Unifix Care selecting RSI sets.

Sorting waste Van Straten Medical (180 minutes)    Transport to the office (automated)    Inspecting each item individually (60 min)






This process needs to be done by hand and is prone to cause infection as many objects may be sharp. This process needs to be handled with caution. The highest quality items that are in good condition are picked out by hand.


The box is transported to the Unifix Care office. Containing a variety average of more than 100 instruments.

Each instrument is inspected carefully for quality and condition. Malfunctions can be detected and the instrument will be taken away from the process.


Categorizing each item (20 minutes) - 352 Items



Not Useful (f.e. Specialist instruments) - 148 items




Useful (f.e. Generic instruments) - 204 items




All the instruments are sorted by type. A distinction can be made for generic instruments and specialist instruments. Unifix Care will focus on generic instruments in this phase.


Useful (f.e. Generic instruments) after composing sets




General set 36/49 pcs. (incomplete) (30 minutes)




Delivery set 5/13 pcs. (incomplete) 15 min



Surgical examination set 11/26 (incomplete) 25 min

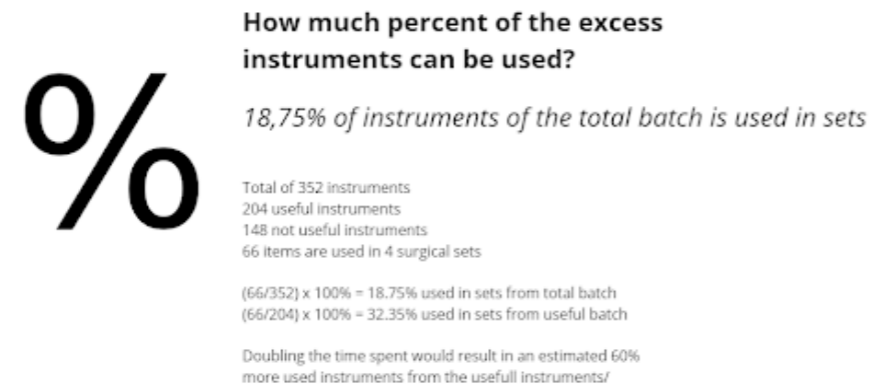
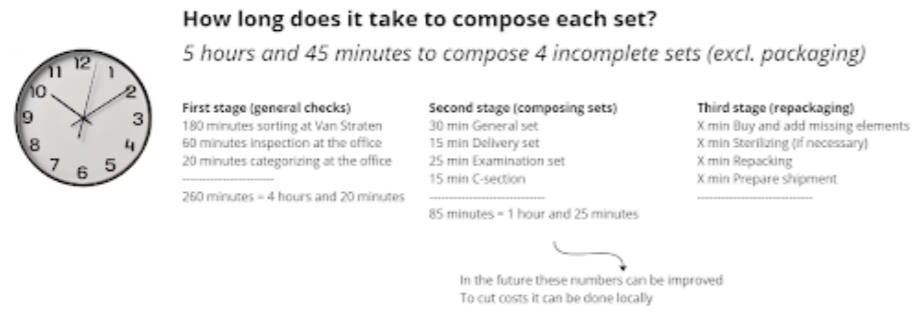


C-section 14/64 (incomplete) 15 min



Sets are composed with the useful instruments

Results



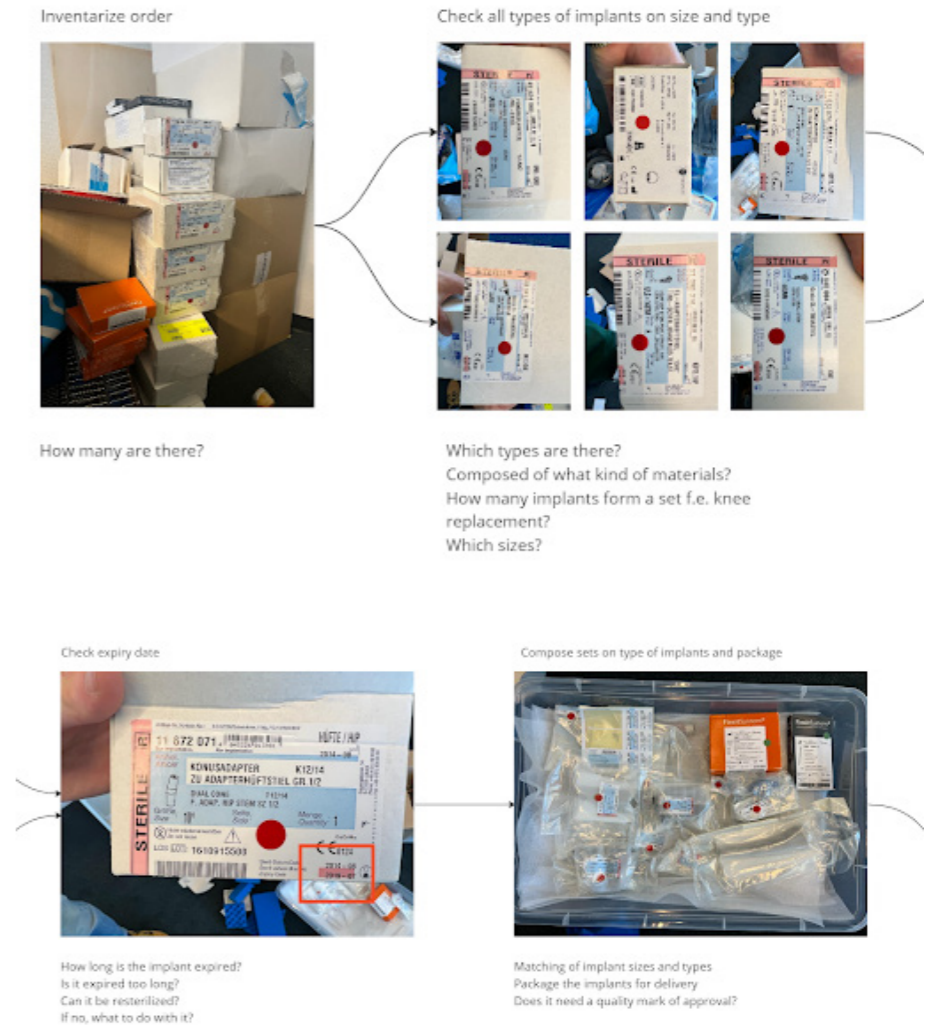
### Discussion

To enhance completeness, a flexibility margin of 40mm was included in the sorting process. For instance, if forceps measuring 140mm were required, forceps measuring between 100mm and 180mm could be included in the second-life set. From this batch, four sets could be assembled. Unfortunately, none of these sets were able to be fully completed with the available instruments. It is evident that many instruments are still available for use, but they could not be added to any of the four sets. This raises several new questions, such as whether there is a consistent shortage of certain instruments, such as the missing kidney bowl in all four sets. It is essential to identify the missing instruments and purchase them to complete the surgical sets. Additionally, it is uncertain how many more batches would be required to create complete sets.

### Conclusion

### Expired Implants

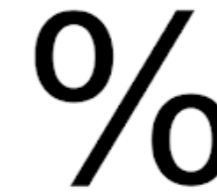
The process of Unifix Care selecting Expired Implants



### Results:

No sets were able to be assembled from this batch due to different sizes of the hip components. Although the trauma components may be useful, additional screws are required. An update from Unifix Care regarding their supplier revealed that the supply of implants has completely ceased. It is uncertain whether additional batches will arrive at Unifix Care, and it is possible that the supplier of expired implants is violating their contract by providing them to Unifix Care.

Unifix Care Inventory	Knee Set	Hip set	Trauma elements
<b>Knee elements</b>			
2x Genia Tibia stem Cem. less - Genia CL - Tibiasstiel (size: 4/85mm)	Genia Tibia stem CL		
4x Genia Tibial component Cem. Modular - Genia C - Tibiasockel Modular (size: large)	Genia Tibial component L		
2x Femoral Component Pol-endo - ST/MC - Femurgelenkteil POL - Endo (size: Large/5*) (side: R)	Femoral component L/S		
<b>Hip elements</b>			
1x Metal head SL T12/14 (size X-Long 28mm)		Femoral head / Metal head X Long 28mm	
2x Adap. Hip stem, part. struct. GHE Cem. less, TiNb - Coat., Collarless - CL - Adapterhufstiel TiNb - Besch., Kragenlos, teilst (size 6/LG = 140mm) (side: R)		Adapt. Hip stem, 6/LG = 140mm R	
3x Cemented straight stem - C-geradschaft K12/14 (size: 4/LG=160mm)		Cemented straight stem size 4/LG-160mm	
4x Dual Cone F. Adap. Hip stem SZ 1/2 - Konusadapter Zu Adapterhufstiel K12/14 GR 1/2 (size 10*)		Dual cone F. Adap Hip Size 10*	
<b>Trauma components</b>			
4x Flexit system: Plaque Osteotomie Tibiale Soustraction Gauche   Closing wedge HTO LEFT plate (size: I)			Flexit system: Plaque Osteotomie Tibiale Soustraction Gauche   Closing wedge HTO LEFT plate (size: I)
4x Locking screw (75mm)			4x Locking screw (75mm)
<b>Missing elements</b>	Plastic spacer, tibial tray, patella button, Tibial baseplate, wedge agment, block augment, keel, offset adaptor, tapered conical stem, fluted stem.	Acetabular Component, plastic liner	



**How much percent of the excess implants can be used?**

*30,77% of implants of the total batch is used*

Total of 26 implants  
26 useful implants  
8 items can be used

$(8/3700) \times 100\% = 30,77\%$  used from total batch

Doubling the time spent would result in an estimated 0% more used implants from the useful implants

**conclusion**

3.1 The supply of Unifix Care products is adequate  
SUSI

27,02% of a yearly batch of 3700 instruments could be used. 300 destichting sets and 16 Mayo Hegar Needleholders could be composed in 9 hours and 8 minutes.

RSI

18,75% of one batch of 352 instruments could be used. 4 incomplete surgical sets could be composed: General surgical set, Delivery Set, Family Planning Set, Examination set in 5 hours and 45 minutes.

EI

30,77% of one batch of 26 implants could be used. No sets could be completed and no time recording could be measured.

This development has implications for our research, as we must rely on the current data. However, the data is inconclusive due to the small sample size, and we are currently unable to estimate whether complete sets can be provided. At present, no sets can be assembled, and the supply of EIs appears to be inconsistent.

**Conclusion**

There are four Flexit systems available, including the Plaque Osteotomie Tibiale Soustraction Gauche and Closing wedge HTO LEFT plate (size: I), along with four locking screws (75mm). However, There could be no time estimation provided for these items because of the small batch size. The supply of implants has completely ceased. It is uncertain whether additional batches will arrive at Unifix Care. This will influence the decisionmaking.

# G

## Pricing analysis

### Introduction

This chapter will focus on the viability aspect by validating the following assumption:

#### 4.1 Unifix Care products are more affordable than current alternatives

For this viability study the current market prices are compared to the costs Unifix Care will make to repurpose the product categories in a desired way (see factors chapter 1). To validate this assumption, I went through the whole process of reprocessing SUSIs and RSIs. No sufficient data of pricing could be found for this research on EI. Therefore this product category won't be covered. More research is necessary to build a substantiated viability assessment on implants. The work has been captured and the time spent on it has been recorded. This gave me a good understanding of the work it took to work towards a desirable product. In this chapter, a substantiated estimate will be made of the cost Unifix Care will make to reprocess each product category. The costs will be evaluated with competitors on the market to see if Second-life instruments would be a viable option to compete in the Kenya market.

### SUSI

#### Method



Unifix Care has a constant supply of incomplete SUSI sets. These sets need to be completed for a desired product.

For this analysis, a stitching set, Destichting set, Parturition set, 25 Mayo Hegar Needlefeeder set, and 25x Iris Scissors set are used for price comparison.

Additional items to complete the set: To complete the sets, disposables from Merkela will be purchased. A Dutch firm that

provides a variety of SUSI equipment.

Labour costs: It requires human labor to separate the instruments at Van Straten Medical, sort the instruments out, inspect the instruments and composing them into sets. In this block, the total hours spent sorting will be calculated. The whole process was performed and clocked by me to register the work hours. (See SUSI chapter 3) An hourly rate of 34,72 euro was incorporated, which is the average amount that a working person will cost for a company. (source)

Service costs: SUSI instruments are expected to be used instantly. Therefore they need to be packaged sterile. This will generate the highest service costs. For simplifying reasons, only these costs are taken into account: cleaning/sterilization costs - 0,50 euro (source) & packaging costs - 2,05 euro (source).

These service factors will not be considered in this assessment: Transport costs (as not included in the Merkela prices), Insurance costs, Shipment packaging, Information/instruction, Warranty/quality assurance, labeling, Marketing.

### Results

	Stitching set	Parturition set	De stitching set	25x Mayo Hegar Needlefeeder	25x Iris Scissors
Merkala (new price)	11,56 euro	15,15 euro	8,60 euro	138,65 euro	100,85 euro
Unifix Care costs excl. service	3,97 euro	5,47 euro	2,97 euro	31,34 euro	41,20 euro
% of new price excl. service	34,3%	35,3%	34,5%	22,6%	40,9%
Unifix Care costs incl. Service	6,52 euro	8,02 euro	5,52 euro	95,09 euro	104,95 euro
% of new price incl. service	56,4%	52,9%	64,2%	68,6%	104,1%

Used SUSI sets would be 22,6% - 40,9% of the new price (service costs excluded)  
 Used SUSI sets would be 52,4% - 104,1% of the new price (service costs included)

**Discussion**

For this analysis assumptions are made:  
 The costs for sterilizing in the Netherlands are taken as an example, this can be done in Africa as well.  
 Prices of the SUSI sets were taken as an example from a Dutch supplier as a Kenyan supplier was not found that sold SUSI sets. Are SUSI sets even sold in Kenya?  
 Calculations have been made if all disposable sets need to be delivered sterile. To keep the prices as low as possible, the instruments can be delivered without sterilizing or without sorting. Lots of SUSI's are left over in this research that could have potential value but are not taken into account because no existing sets could be composed with these. Further research is necessary to explore the variety of SUSI sets.  
 During selection of the sets, there was incorporated a margin so there was a higher chance of completing a set. Without this margin, more new instruments needed to be acquired, resulting in higher costs.

**Conclusion**

Used SUSI sets would be 52,4% - 104,1% of the new price (service costs included)

**RSI**

**Method**



Unifix Care has a constant supply of incomplete RSI sets. These sets need to be completed for a desired product set.

For this analysis, a General Surgical Set, Delivery Set and Family Planning set are used for price comparison.

Additional items to complete the set: To complete the sets, RSI will be purchased from NOPA. An affordable quality RSI brand that Unifix Care has access to their pricelists.

Labour costs: It requires human labor to separate the instruments at Van Straten Medical, sort the instruments out, inspect the instruments and composing them into sets. In this block, the total hours spent sorting will be calculated. The whole process was performed and clocked by me to register the work hours. (See RSI chapter 3) An hourly rate of 34,72 euro was incorporated, which is the average amount that a working person will cost for a company. (source)

Service costs: RSIs are not expected to be sterile and only need to be delivered clean. The RSI will be disinfected under sterile circumstances. For simplifying reasons, only these costs are taken into account: cleaning/sterilization costs - 0,50 euro (source).

These service factors will not be considered in this assessment: Transport costs (as not included in the Merkela prices), Insurance costs, Shipment packaging, Information/instruction, Warranty/quality assurance, Marketing.

**Results**

	General surgical set	Delivery Set	Family Planning Set
Harleys Limited	29000KsH 220,4 euro	8150 KSH 61,94 euro	11550 KSH 87,78 euro
Medical Equipment Supplies Kenya	39850 KSH 297,99 euro	9000KSH 67,30 euro	14520 KSH 108,58 euro
Costs of Extra instruments	112,08 euro	54,72 euro	116,16 euro
Unifix Care costs excl. service	193,92 euro	95,64 euro	184,36 euro
% of new price excl. service	87,9%	154,40%	210,03%
Unifix Care costs incl. service	218,42 euro	102,14 euro	197,3 euro
% of new price incl. service	99,10%	164,90%	224,83%

Used RSI sets would be 87,9% - 210,03% of the new price (service costs excluded)

Used RSI sets would be 99,10% - 224,83% of the new price (service costs included)

#### Discussion

For this analysis assumptions are made:

During selection of the sets, there was incorporated a margin so there was a higher chance of completing a set. Without this margin, more new instruments needed to be acquired, resulting in higher costs.

After selection, lots of instruments were not composed to a set. This opens opportunities.

Work hours are 34,72 per hour for Unifix Care. This wage could be decreased.

The prices from NOPA are used. There may be cheaper options on the market to complete the surgical sets.

For the calculation a total price is used instead of direct comparison with the set prices. This is because of the sequence of set composition. The set that is composed first will be the most complete and will have a more competitive price. To use a total price/ average price will give a better understanding of the value on a larger scale.

All instruments are received for free by Unifix Care (no acquisition costs are taken into account)

#### Conclusion

Used RSI sets would be 99,10% - 224,83% of the new price (service costs included)

EI

No time estimation is present for composing a set.

No information on market prices as the supplier broke contact with Unifix Care.

2 price requests from Orthopedic Surgeons are in process in Kenya, but no response yet. This chapter is inconclusive.



# H

## Global trends

### Healthcare demand will surge

Health insurance

Implementation of national health insurance will surge healthcare demand and therefore lead to expansion of existing hospitals and development of new hospitals. This boosts the surgical instrument market.

- Uganda passed NHIS through parliament in 2021
- Kenya planning to launch National Health Insurance by the end of 2023
- Nigeria - Launched National Health Insurance Authority in 2022
- Sierra Leone - Launched Sierra Leone Social health Insurance in 2018

### Unfix Care receives government support

RVO focus

The Dutch government has defined Kenya, Nigeria and Uganda as focus countries and therefore offer additional operational and financial support to settling enterprises.

Kenya, Nigeria, Uganda and Sierra Leone are Dutch Good Growth Fund (DGGF) countries and Kenya, Nigeria and Uganda are focuscountries of the demonstratieprojecten, haalbaarheidsstudies en investeringsvoorbereidingsprojecten (DHI)

### Unifix Care can scale effeciently

AFCFTA

Logistical processes within the African continent are simplified with the African Continental Free Trade Area agreement. This will enable efficient expansion to other countries

The African Continental Free Trade Area (AfCFTA) agreement commenced in 1st of January 2021 has created the largest free trade area in the world measured by the number of countries (54) participating.

Figure XXX. Global trends predicting growth

# Interview Prof. Hultink

If you look at Ansoff:  
multiple expansion possibilities as a metric from the 70's which is still correct:  
sell more products in the same market  
more use/intensive use of the same product in the same market  
new product in the existing market (product development)  
same product on a new market (market development)  
new product on a new market (market diversification)

What you see at many organizations is that their product portfolio and expansion projects (new products and expansions) are not strategically aligned. If Unifix Care does not know what their strategy is, or if they don't know what kind of company they want to become and how. Then it becomes very difficult to select expansion possibilities.

If you don't position your product, your customer will do it for you. And that may result in an undesired result.

If you want to become the technological pioneer in the market, it is smart to not only develop line extensions, but also technological development and research and fundamental innovations. You'll need a portfolio that is strategically aligned with products and expansion developments that aligns your vision. (If you want to become the technological pioneer in the market f.e.)  
It is very difficult to make a selection of development projects for expansion if you don't have a strategy. The criteria to determine whether to do something or not, should be derived from your strategy. Your strategy isn't derived from decision criteria, your decision criteria are derived from your strategy.

Companies that are not happy with their innovation portfolio have the same problem. That problem is not specific to any company, not specific to Unilever, Phillips, a bank or simple farmer, they simply had too many things to work on. I've done 25 years of research and I've never seen a company that had too few ideas or doing too little projects. Every company I met was working on too many projects, had too many ideas at the same time with the time, people and resources available. The result was that the overall process slowed

down and that they were not working on implementing their innovation strategy but spending time and energy on 'fire fighting problems'. Running from project to project to keep everything in line.

I've done a workshop that took at least 3 days with these companies to clarify what actually their innovation strategy was. To define their positioning, characteristics, and brand personality. When you have a strategy, the company can choose which expansion project fits to develop, this is where the strategy helps a company.

In a portfolio you need a balance of high-risk expansion projects and low risk expansion projects. But also in a timeframe, project that take 5 year, and projects that are finished within 1 year. How more radical the innovation, how more time and energy, but the profits and impact may be the largest. It is important that you spread these risks, same as shares on the stock market. You need mix a high risk/low risk and long term/short term shares.

"You need a strategy before you can decide to expand your product catalog" - Prof. Hultink E.J.

Ansoff matrix

To achieve growth and expand from one product to multiple products, Ansoff's matrix (Loredana, p. 144) suggests several strategies:

Sell more products in the same market.  
Increase the use or intensity of the same product in the same market.  
Develop new products for the existing market.  
Enter new markets with the same product.  
Introduce new products in new markets.  
By considering these options and aligning them with Unifix Care's strategy, the company can determine the best approach to achieve growth and expand its product offerings.

# Management literature research

We are not going to reinvent the wheel in this project. Lots of proven strategies are out there. In this chapter, I am going to what strategies are popular within the start-up community. For this I will consult established startups to track down the most used strategies. In this research, I will focus on books that help determine strategy for companies.

## Approach

Find useful books through a quantitative study with existing start-ups in the top business incubator of 2017/2018: YESdelft. Leveraging the knowledge and experience of established start-ups to find books that have helped these companies to build a strategy. I will select the most used books and Analyze the content of the books through desk research.

## Method

Step 1: Quantitative study at YESdelft! start-ups and desk research  
Interviewed 13 start-ups & 1 start-up incubator coach.

The question for each start-up was:

“Can you name a book that helped to design a strategy for your start-up?”

Step 2: Book assessment: Does this book contain a strategy for expansion?

The recommended books will be assessed to determine if the books can help to build a strategy for Unifix Care. As not all books recommended by the start-ups describe a strategy that can help Unifix Care the useful books will be separated from the books that don't describe a specific strategy for expansion.

## Results:

Impact Studio:

The Lean start-up

Crossing the chasm

The mom test

Running Lean - Ash maurya

Zero to one

How to win friends and influence people

Plense:

The lean start-up  
Start-up owners manual  
Disciplined entrepreneurship  
The mom test

Tiler:

Lean start-up

Value proposition canvas

Hacking growth

Building your story brand

strategic selling - miller heijman

Ubiqu:

Smart cuts

Gyrometrics:

Lean startup

From idea to product market fit - omar mohout

Lean pricing - new one from omar on pricing

never split the difference - chriss boss

Slam orthopedic:

The hard thing about hard things

Start-up owners manual

Geotherm electric:

The mom test (both covered in the YESdelft validation lab)

The lean start-up

Nurtio

Lean start-up - meer academic

Ash morlay - Running lean

Escaping the build trap - more tactical

strategize - Roman pichler

Value proposition design - max ostwalder

Valley optics

Mom test

How to become investor ready

Harvard business review: <https://hbr.org/2018/05/strategy-for-start-ups>

Dental robotics:

Zero to one

Ryberg

They don't have a strategy

Recommend to use the basic book of company economics for 3ME  
Follow a bookkeeper course

Newton energy solutions:  
No strategy books

T-minus engineering  
No strategy and no books to recommend

Dot robot  
No strategy and no books to recommend

Final results:  
The Lean Start-Up - Eric Ries  
Zero to One - Blake Masters & Peter Thiel  
Start-up Owner's Manual - Bob Dorf & Steve Blank  
Running Lean - Ash Maurya  
Value Proposition Design - Alexander Osterwalder  
Crossing the Chasm - Geoffrey Moore  
Disciplined Entrepreneurship - Bill Aulet  
Hacking Growth - Morgan Brown & Sean Ellis  
Strategic Selling - Miller Heiman & Michael Krasny  
Escaping the Build Trap - Melissa Perri  
Strategize - Roman Pichler  
Harvard Business Review: Strategy for Start-Ups

Limitations  
Mom test & lean startup part of the YESdelft validation lab. Most of this start-ups followed the course of YESdelft, in this course these books were recommended to read. This may influence the recommendations.

Didn't have time to read all books. Separation is based on a Quicksan using Google for book summaries.

Conclusion  
This research aimed to identify popular strategies within the start-up community by consulting established start-ups and analyzing books that have helped them build their strategies. Twelve books have been selected as useful resources for Unifix Care in developing its own expansion strategy:

## Method

### Decision matrix

Requirements / Books	1	2	3	4	5	6	7	8	9	10	11	12
Does the strategy facilitate agile learning and adaptation to varying contexts?	5	3	2	5	2	1	2	3	2	4	2	3
Does this strategy promote experimentation, utilizing high-quality knowledge and resources, to achieve impactful outcomes?	4	3	3	1	3	2	3	4	1	3	3	2
Does this strategy aim to bypass political influence and foster close collaboration with customers to bridge cultural gaps?	2	1	1	2	1	3	1	2	4	1	1	2
Does this strategy prioritize impact and collaboration with aligned organizations to create a better world?	1	4	1	1	2	2	1	1	1	3	1	2
<b>Total</b>	<b>12</b>	<b>11</b>	<b>7</b>	<b>9</b>	<b>8</b>	<b>8</b>	<b>7</b>	<b>10</b>	<b>8</b>	<b>11</b>	<b>7</b>	<b>9</b>

# J

# SWOT analysis workshop

It is essential for organizations to have a clear understanding of their internal capabilities and external market dynamics. To navigate the complexities of the market and maximize their chances of success, start-up companies like Unifix Care must undertake a comprehensive analysis of their strategic position. One effective tool for this purpose is the SWOT analysis.

## Method

Conducting a SWOT analysis for Unifix Care serves four main purposes. Firstly, it helps identify and capitalize on the company's internal strengths to gain a competitive edge. Secondly, it highlights areas of weakness that need improvement for enhanced performance. Thirdly, it uncovers external opportunities to strategically position the company for growth. Additionally, the analysis identifies potential threats, enabling proactive planning and risk mitigation. From the results of the SWOT analysis, the requirements necessary to determine the appropriate strategy can be derived.

The founder team engaged in a digital workshop focused on conducting a SWOT analysis. To facilitate this process, a Miro board was created, allowing participants to fill in their individual worksheets. The steps involved in the analysis are presented in Figure XXX.

## Final strategy requirements:

Does the strategy facilitate agile learning and adaptation to varying contexts?

Does this strategy promote experimentation, utilizing high-quality knowledge and resources, to achieve impactful outcomes?

Does this strategy prioritize impact and collaboration with aligned organizations to create a better world?

Does this strategy aim to bypass political influence and foster close collaboration with customers to bridge cultural gaps?

## Conclusion

Undertaking a SWOT analysis has helped Unifix Care identify its internal strengths, weaknesses, external opportunities, and potential threats. From the analysis, the strategy requirements for the company have been identified. The strategy should facilitate agile learning and adaptation to varying contexts, promote experimentation with high-quality knowledge and resources,

prioritize impact and collaboration with customers and aligned organizations, and bypass political influence. By following these requirements, Unifix Care can position itself strategically for expansion.

## Introduction

Unifix Care wants to find out how to get from here...

...to here



A strategy will be designed that helps Unifix Care to set clear goals and objectives, allocate resources effectively, and make informed decisions to reach their future vision

## How? A SWOT Analysis is the first step to this strategy:

1. By analyzing its strengths, a startup can identify its unique advantages and competitive edge. This can help it to leverage these strengths and position itself effectively in the market.
2. By analyzing its weaknesses, a startup can identify areas where it needs to improve. This can help it to develop a plan to address these weaknesses and minimize risks.
3. By analyzing opportunities, a startup can identify potential markets, customers, or partnerships. This can help it to develop new products or services, enter new markets, or form strategic alliances.
4. By analyzing threats, a startup can identify potential risks and challenges that may affect its success. This can help it to develop a plan to mitigate these risks and minimize potential negative impacts.

## Goal of the SWOT analysis:

In the best scenario, participants should identify actionable steps that can be taken to leverage strengths, address weaknesses, capitalize on opportunities, and mitigate threats. This can help to turn the SWOT analysis into a useful tool for strategic planning and decision-making.

## Assignment 1 (10 min)

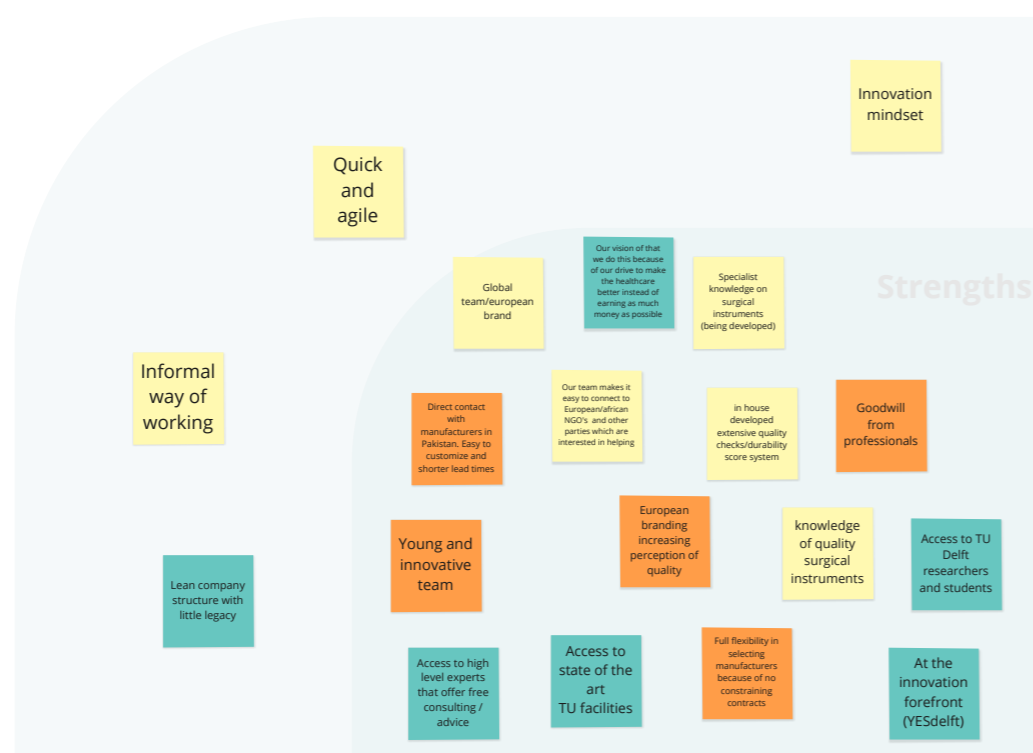
SWOT Crown Healthcare - a large medical equipment provider in Kenya (10 min)



## Assignment 2 (30 min)

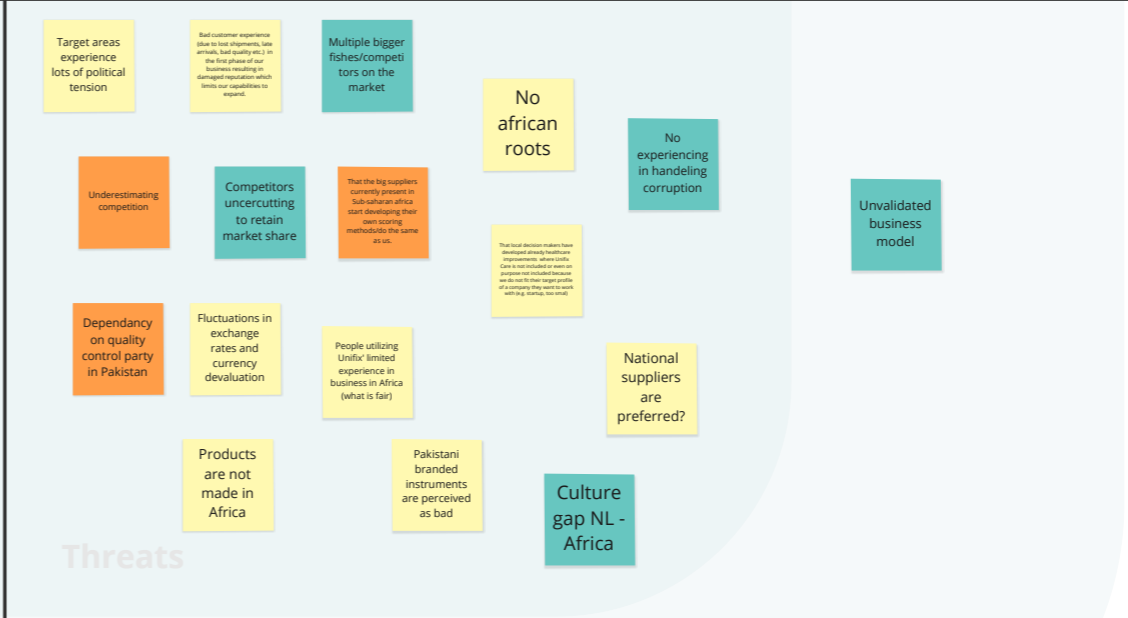
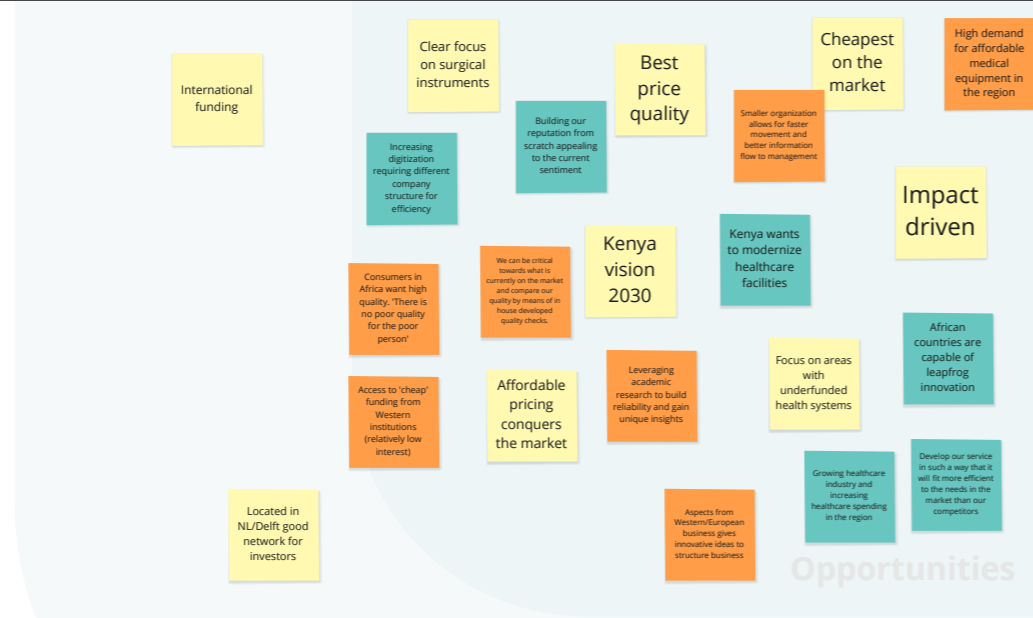
SWOT Unifix Care (20 min)





**General start-up**

**Unifix Care**



Undeveloped network

## Strengths

Ability to quickly learn and get inspired by other companies

Learn quickly, adapt quickly

Access to high quality knowledge and facilities at no cost

Do bold things using high-quality knowledge and facilities

Easy to shift company focus / proposition

The smaller the operation, the more agile

Impact focused team

And impact focused mindset will attract the right investors that share the vision to create a better world. Goodwill and aid will be received.

## Weaknesses

Transformative & moldable organisation

A lack of wisdom and experience allows you to do bold things and make risky moves without thinking too much

Small capacity operation

Reliable on external resources for information and capital

## Opportunities

A quickly changing healthcare environment asks for quick adaption of all stakeholders

Become an organisation that is able to adapt to the environment parallell

Human centered approach to discover the most important customer needs

Learn to understand the customer needs, pains, wishes etc. to breach the cultural gap

Growing market asks for advanced solutions to match the demand.

Find solutions that bypass political influence

Reputation is yet to be determined and can be shaped to the need of the customers

Try out many solutions to see what sticks

## Threats

Wealthy, experienced but unwieldy competitors

Unfamiliar in complex political structures and red tape bureaucracy

Perception of hierarchy, culture of saying yes, directness, unwritten business rules

Phase of flexibility. Low cost of operation

## Conclusion SWOT

Unifix Care should:

Learn quickly, adapt quickly

Do bold things using high-quality knowledge and facilities

The smaller the operation, the more agile

And impact focused mindset will attract the right investors that share the vision to create a better world. Goodwill and aid will be received.

Become an organisation that is able to adapt to the environment parallell

Find solutions that bypass political influence

Learn to understand the customer needs, pains, wishes etc. to breach the cultural gap

Try out many solutions to see what sticks

# K

## Lean start-up method

The total systems consists out of 2 systems:

The core operation - This is the current value proposition of the company. The product or service that generates revenue for the company. In the case of Unifix Care, these are Surgical instrument sets that are delivered to Sierra Leone.

The expansion system - This is where the lean startup method comes into work. This is a closed system where new opportunities will be validated and tested by the build, measure learn loop to become propositions. When opportunities have high potential, they will be adopted into this system and time and resources from the company will be invested to validate or invalidate these potential propositions. If this potential propositions comply with the determined measurements, they will be implemented in the core operation. If not, they will be discarded or set back in the opportunity portfolio for later exploration.

It is important to have a healthy balance between the two systems.

System 1 core operation:

Creates a stable revenue and impact  
Cost the company resources and time

System 2 expansion:

Potentially creates revenue in the future  
Cost the company resources and time

E.J. Hultink mentions that Unifix Care should strive for a balance between high-risk and low-risk expansion projects in their portfolio. Additionally, the portfolio should include projects with varying timeframes, ranging from long-term projects taking several years to short-term projects completed within a year. More radical innovations may require additional time and effort but can potentially yield greater profits and impact.

Due to the capacity of Unifix Care, the recommendation will be to focus on 1 expansion project at a time due to limited resources and time available.

Explanation system 2: Expansion using the Lean start-up method  
The key focus of this system is to determine what should be built by identifying customer needs and preferences, and what will be successful in the market. The primary goal is to deliver a product or service that customers want and are willing to pay for. The system emphasizes the importance of speed and efficiency in decision-making, aiming to quickly determine what initiatives to pursue and what to prioritize. It follows a three-step process: build, measure, and learn.

In the "Learn" phase, the first step is to formulate a hypothesis that addresses the designated problem. It is essential to approach everything as an experiment, recognizing that validation through customer feedback and market response is crucial. To validate the hypothesis, a Minimum Viable Product (MVP) is developed, which represents the solution in its simplest form, focusing only on the essential features necessary for hypothesis approval or rejection.

Different types of MVPs can be utilized depending on the specific opportunity or proposition. These include video MVPs, concierge MVPs, and wizard of Oz MVPs, each serving a unique purpose in the experimentation process. Additionally, the system identifies three engines of growth: sticky, viral, and paid, each with its own metrics and objectives to drive company growth. See Figure XXX.

Figure XXX. The three engines of growth are a way to focus the energy of the startup in the right place.

The decision to pivot or persevere is another critical aspect of this system. It acknowledges the need for both perseverance and flexibility in entrepreneurship. A pivot may be necessary when attempts to tune the MVP and improve the engine of growth prove ineffective. Pivoting involves a strategic change in approach to align with the overall vision, such as shifting target customer segments, value capture methods, or engines of growth. Importantly, a pivot is not viewed as a failure but rather as an opportunity for course correction and learning.

In this current framework, intuition and experience play a role in determining the appropriate actions within the gray zone of decision-making. In this thesis, we seek to enhance the decision-making process in this "gray zone" by introducing evidence-based inputs to complement intuition and experience. We aim to strike a balance between subjective judgments and objective evaluations. This addition aims to provide a more comprehensive and robust decision-making framework that can navigate the uncertainties and challenges faced by start-ups like Unifix Care.





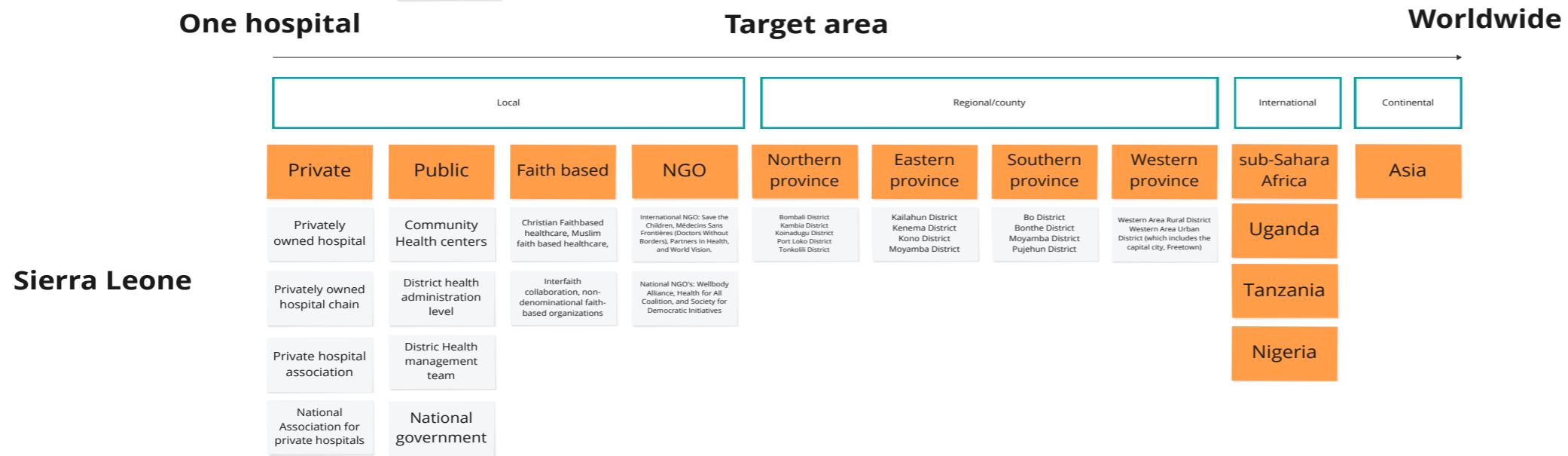
# Opportunity landscapes

## Product catalog

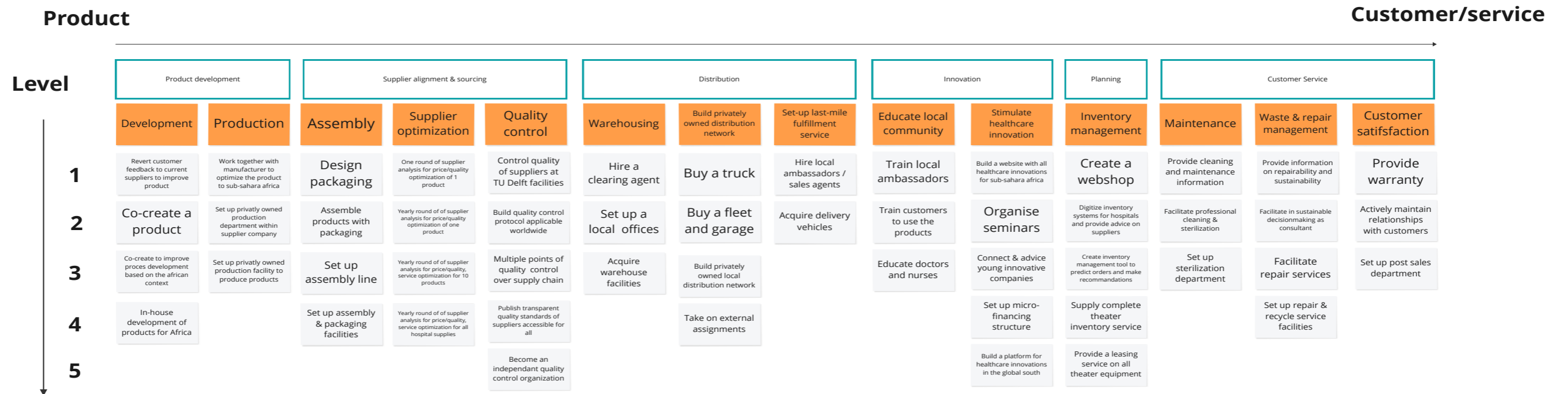
One product

One-stop-shop

Therapeutic equipment			Diagnostic equipment		Life support equipment		Monitoring equipment	Rehabilitation equipment	Personal protective equipment (PPE)	Medical furniture	Anesthesia equipment		Sterilization equipment	
Reusable instruments	Electronic devices	Consumables	Reusable equipment	Electronic devices	Consumables	Electronic devices	Electronic devices	-	Consumables	Furniture	Consumables	Electronical devices	Electronical devices	Consumables
Surgical instrument sets	Infusion pump	Wound care supplies	Otoscope	ultrasound machine	Feeding tube	Oxygen concentrator	Blood glucose meter	Wheelchair, walker, cane, crutches	Masks	Hospital bed	Laryngoscope	Anesthesia machine,	Autoclave	Sterilization pouches
Orthopedic appliances	Syringe pump		Ophthalmoscope	X-ray machine	Tracheostomy tube	oxygen tank	thermometer	prosthetic limb	Gloves	examination table	Airway supplies including breathing circuits, filters, masks, and tubes (endotracheal tube)	Pulse oximeter	chemical sterilizer	Sterilization pouches
	Dialysis machine		Stethoscope	CT scanner	Urinary catheter	ventilator	pulse oximeter	braces and supports, orthotic device	Gowns	medical cart/ mayo stand	laryngeal mask airway	Capnograph	UV sterilizer	Sterilant solutions
	Nebulizer			MRI machine	Central line	cardiac monitor	EEG machine	traction device	Faceshields	IV pole				
	CPAP machine			Blood pressure monitor		defibrillator	Holter monitor	Excercise equipment	Hair covers	overbed table				
	ventilator			pulse oximeter		intra-aortic	ambulatory blood pressure monitor		Shoe covers	patient lift				
	defibrillator			ECG machine		balloon pump	CGM system		Respirators	suction machine				
							fetal monitor		Protective eyewear	operating table/ Surgical table				
							cardiac output monitor		Hazmat suits	surgical lights				
									Aprons	stretcher				
										wheelchair ramp				



## Value chain



# M

## Effective decision-making

### Effective decision-making

The negative impact of poor portfolio decisions on performance can be significant. Therefore we must determine what it means to make decision-making as effective as possible. In this chapter we will work towards the foundation for the decisions support model. At the end of this chapter, a list of requirements will be presented.

#### Method

Literature research

What does the decision support models need to do? - For effective decision making

What decision inputs should the model include?

Why is this bad or not sustainable on the long term?

#### Results

The research from (Cooper et al., 1999) found that the portfolio evaluation and management methods used by large firms were not particularly efficient, user-friendly, realistic in capturing key facets of the decision problem or even well understood by senior management. By gaining a deeper understanding of the dynamic nature and potential of the Design Thinking (DT) process and its tools, innovation managers can enhance their involvement in and facilitation of innovation processes. This, in turn, leads to the development of a more streamlined and user-friendly process, aiming for increased efficiency. (Tschimmel, p. 17) A shift from traditional business thinking towards a design thinking approach would improve the decision-making. (source)

	<b>Traditional Business Thinking</b>	<b>Design Thinking</b>
Guiding light	Organization first	User first
Purpose/goals	Maximize (revenue, profits)	Optimize (user experience)
Evidence	Quantitative (numbers)	Qualitative (stories)
Work style	Continuous	Project-based
Mode of thinking	Deductive, inductive	Deductive, inductive, abductive
Failure	To be avoided	To be welcomed as learning
Constraints	Limit options	Improve tractability

(Liedtka and Ogilvie, 2011, p. 22)

1. What does the decision support models need to do? - For effective decision making

Adopting a Portfolio Mindset.

A portfolio mindset means that the firm's decision-making processes have produced a complete understanding of all of the projects in the portfolio, and that the projects in the portfolio are aligned with the firm's strategy. An effective portfolio management process provides an ongoing overview of all of the projects being considered, all those underway, where each of those projects is currently positioned in the NPD process, and when each is expected to launch into the marketplace

Agility in Decision-Making.

Firms with effective portfolio decision-making practices need to be agile. They can make decisions quickly when needed. For example, if a major technology is invented that allows them to improve their solution to a target market problem, or if a competitor unexpectedly changes direction, their decision-making processes should allow them to address those opportunities in a proactive, rather than reactive manner

Focused Effort.

Good portfolio management processes should keep the firm's efforts focused on only those short-term actions that will enable them to achieve their long-term goals. This effort prevents teams and product line managers from just chasing innovation in an opportunistic manner. (Kester et al., p. 18)

“Cooper, R.G., Edgett, S.J., and Kleinschmidt, E.J. (1999). New product portfolio management: Practices and performance. Journal of Product Innovation Management, 16: 333-351.” (Kester et al., p. 7)

2. What should the model include? - Decision inputs

The decision support model should include the following decision inputs:

Evidence-based inputs:

Multiple perspectives and shared experience, analytical knowledge, and market knowledge derived from cross-functional collaboration, critical thinking processes, and market immersion.

Subjective opinion (opinion based) :

Subjective decision inputs generated through intuition, which may not be backed up by argumentation but are based on feelings and conclusions from experience.

Political processes (power based):

Power dynamics and decision inputs influenced by individuals or subgroups through informal processes of influence, persuasion, and negotiation, potentially compromising decision quality and objective rationale.

Therefore, the decision support model should consider these various types of decision inputs, including evidence-based inputs, subjective opinions, and inputs influenced by political processes, to

provide a comprehensive framework for decision-making.  
(Kester et al., p. 26)

Figure XXX. General model of portfolio decision making by Kester.  
2009

3. Why is this bad or not sustainable on the long term?

The negative impact of poor portfolio decisions on performance can be significant. (Cooper and Edgett, p. 6) "Recent examples of firms losing money due to poor portfolio management decisions prevail in the American car industry (www.businessweek.com). Bill Ford acknowledged in 2006 that it was due to the failure of management to make the right portfolio decisions that Ford Motor declined into financial trouble. At the same time, General Motors witnessed their US market shares go down from 53% to 20% over the past four decades, while continuing to build cars that people did not want to buy." (Kester et al., p. 4)

Conclusion

A set of requirements and decision inputs have been created in this chapter to set a solid foundation for the decision support model.

Requirements for a design thinking approach:

- Guiding light is the user first
- Purpose/goals are to optimize the user experience
- Evidence is provided through qualitative research (stories)
- Workstyle is project-based
- Mode of thinking is deductive, inductive, abductive
- Failure is to be welcomed as learning
- Constraints are to improve tractability

Requirements for effective decision-making:

- Decision-making processes have produced a complete understanding of all of the projects in the portfolio, and that the projects in the portfolio are aligned with the firm's strategy.
- They can make decisions quickly when needed. Should keep the firm's efforts focused on only those short-term actions
- Decision making is done efficiently
- The decision making process is user-friendly
- Be realistic in capturing key facets to make decisions

Requirements for effective decision making should include these decision inputs/can be divided into these categories:

- Evidence-based inputs
- Subjective opinion (opinion based)
- Political processes (power based)

## Current decision-making practices

We have an understanding what the important requirements are for effective decision making. Let's look at how that is performed in practice at UC and a similar start-up. Analyze how Unifix Care makes decisions & Investigate how other start-ups make decisions. Do they comply with the requirements or are adjustments necessary?

Approach

Interview with similar start-up - Sommalife: An impact focused start-up in operating in Ghana.  
Introduction about Sommalife  
Sommalife is a social enterprise that uses modern technology to create sustainable income and impact in rural communities. They are dedicated to establishing a future where rural women get the income and rewards they deserve for the value they create. Their vision is to eliminate the gap between stakeholders in the shea value chain and to guarantee transparency and traceability.

What are the similarities between Unifix? Why is it valuable?  
They are both start-ups from originated from TU Delft.  
Both focus on Sub-Saharan Africa and are impact-focused.  
Equal founding team (3 students from the TU Delft with a University degree)  
Both in a relative beginning phase of maturity. Sommalife is a more matured and has gone through the stages UC is in right now. This makes their learnings and analyzing their way of working valuable.

Method

Semi-structured interview with current Co-Founder Sommalife (Tom Savalle) to find out:  
How do others comparable start-ups make decisions?  
How does Sommalife decide what product or service to expand to & what not to do?

An internal quick-scan at Unifix Care to find out:

- How is Unifix Care making decisions now?
- Use of existing knowledge during this thesis

A table is created that scores all the requirements determined in previous chapter that determine effective decisionmaking. Unifix Care and Sommalife will be scored on these requirements to see where improvement is necessary. After this study, a recommendation can be done on which Unifix Care needs to improve to make effective decisions.

Results

Sommalife has no conscious predetermined strategic decision method. They enforce the mindset: Be open to new learnings because the context is too unpredictable to say if something works beforehand.

Sommalife makes decisions primarily based on profits. "You can't scale if there is no profit/future profit."

"You can choose not to focus on profit but on impact f.e. But you can't have too many of those focus units in your business."

They've experienced a hard lesson: Profit > Impact

Better to have an economically sustainable company that has 99% profit and 1% impact than a struggling company that has 50% profit and 50% impact.

Sommalife has made many decisions without a strategy, simply by checking what works with an open mindset, with some values taken into account. They have their core business and trying out 4 different pilot propositions to see if they will take the pilots into their core business. The main factor they take into consideration is profitability. Other factors that are taken into account but are less important:

- Complementary on core business
- Usage of similar infrastructure
- Impact

How is Unifix Care making decisions now?

Unifix Care is taking an approach of validating ideas/concepts within a year. With the knowledge they have, they are able to shift/pivot toward a new proposition. The direction they are heading is determined by opportunities in a changing context and the limited tools and resources they have at hand. They get coached by certain experts, that will give them advice when they are called upon. With the information that I have gathered during these entire research I can assume I have a good understanding into the decisionmaking of Unifix Care and its journey towards reaching their vision (See chapter Unifix Journey XXX). See Figure XXX for the testing the requirements to the current standards of Sommalife & Unifix Care

Towards a design thinking approach:	Sommalife	Unifix Care
Guiding light is the user first	++	++
Purpose/goals are to optimize the user experience	+	++
Evidence is provided through qualitative research (stories)	+	++
Workstyle is project-based	-	-
Mode of thinking is deductive, inductive, abductive	++	++
Failure is to be welcomed as learning	++	++
Constraints are to improve tractability	++	++
<b>Requirements for effective decision-making:</b>		
Decision-making processes have produced a complete understanding of all of the projects in the portfolio, and that the projects in the portfolio are aligned with the firm's strategy.	-	-
They can make decisions quickly when needed. Should keep the firm's efforts focused on only those short-term actions	+	++
Decision making is done efficiently	-	-
The decision making process is user-friendly	-	-
Be realistic in capturing key facets to make decisions	+	-
<b>Balance between inputs:</b>		
Evidence-based inputs	-	-
Subjective opinion (opinion based)	++	++
Political processes (power based)	++	++

## Conclusion

Unifix Care and Sommalife are both making decisions now based on too much on subjective decision inputs generated through intuition, which may not be backed up by argumentation but are based on opinion, power and conclusions from experience. For both companies, there is a need for more evidence based inputs to make decisions. They do not use a project based workstyle and don't use a userfriendly framework to help them make important decision efficiently. Aside from that, the companies do not have a specific strategy to make decisions yet, therefore they are unable to determine whether an opportunity fits their strategy. This may result in a confusion product portfolio. It is therefore important to establish a strategy that helps align the product portfolio with the strategy. Unifix Care is likely to not consider all relevant factors that determine effective decisionmaking, this needs to be improved. In short: Unifix Care needs more evidence based input, a project based workstyle in a userfriendly framework to make effective decisions that align with the strategy.

# N

## Consequences of decisions

### 3.4 Consequences of decisions

Determining whether to proceed with a particular opportunity or not requires a comprehensive understanding of the consequences it delivers. This study aims to establish a shared comprehension of the consequences associated with general expanding into each of the three expansion categories. Walsh et al. (2019, p. 3414) emphasize the significance of investigating unintended consequences in order to identify and mitigate potential failures in design engineering. It is advisable to anticipate these consequences to make an informed choice about disregarding or managing them. Failing to anticipate them can lead to system failures.

### Approach

To thoroughly assess the advantages and disadvantages of each expansion category, a brainwriting session was conducted to generate a wide range of reasons favoring the decision to proceed from the perspective of Unifix Care. See figure XXX. The outcomes of this session can offer profound insights into the potential benefits and risks associated with each category expansion. These insights can then be translated into a rubric, which will serve as an integral component of the decision support model.

### Method

Steps to build the rubric:

The rubric is to provide a clear and consistent framework for assessing factors

#### Step 1: Brainwriting session

Brainwriting session - collaborative idea generation technique that allows individuals to generate and share ideas in a written format rather than through verbal discussions. In a brainwriting session, participants write down their ideas on a specific topic or problem on individual sheets of paper. These sheets are then passed on to other participants who build upon the ideas or generate new ones. This process continues, with participants reading and adding to the ideas written by others, fostering a free-flowing exchange of thoughts and encouraging diverse perspectives. Brainwriting is an effective method to stimulate creativity, encourage equal

participation, and generate a large volume of ideas within a group setting.  
with 3 founders

The participants approached these questions with a “positive” attitude.

What are the benefits of expanding into a new target area?

What are the benefits of expanding in the value chain?

What are the benefits of expanding the product catalog?

The participants approached these questions with a “sceptical” attitude.

What are reasons to avoid expanding into a new target area?

What are reasons to avoid expanding in the value chain?

What are reasons to avoid expanding the product catalog?

Step 2: The examples from the brainwriting session are analyzed.

### Examples from brainwriting



### Target area expansion

#### 4.1 What are the opportunities in this area?



Step 3: The examples (positive & negative) are matched with the factors (for example: 4.1 What are the opportunities in this area?)

Step 4: The selected examples connected to a specific factor are translated into three rubric outcomes of a rubric: A bad outcome, neutral outcome and a good outcome.

### Example

#### Bad outcome

Expanding into this area poses challenges due to limited opportunities, resulting in Unifix Care having less focus and understanding in a specific region. The risk of quick expansion

without adequate operational capacity increases, potentially compromising effectiveness. The likelihood of quality loss due to rapid growth is high. Additionally, substantial investment of resources and time is required to successfully expand into this area, further adding to the complexity and demands on the organization.

#### Neutral outcome

Expanding into this area presents both opportunities and challenges for Unifix Care. While there are limited opportunities, careful consideration is required to maintain focus and understanding in a specific region. The risk of quick expansion without adequate operational capacity exists, which may impact effectiveness to some extent. Quality could be maintained through proper management and strategic scaling. However, expanding into this area would still require significant investment of resources and time, demanding careful planning and execution.

#### Good outcome

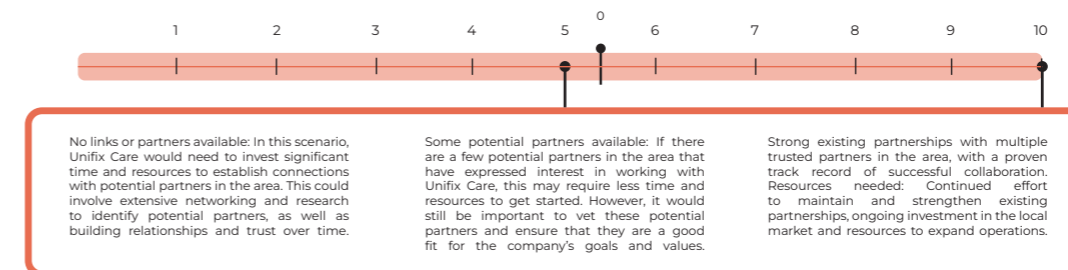
Expanding operations enables to serve a larger population, resulting in a greater impact and ultimately saving more lives. Moreover, reaching neglected markets not only enhances impact but also unlocks new potential revenue streams, leading to increased profitability. By capitalizing on these opportunities, businesses can simultaneously make a difference in underserved communities, achieve financial growth, and maximize their overall impact

#### Results

This is an example that has 3 potential outcomes  
This rubric is made for every factor in the Decision support model  
the aid the decision-making process.

### Brainwriting with founders Unifix Care themed: Consequences of decisions

#### Is there a trustworthy local representative or partner in that area?



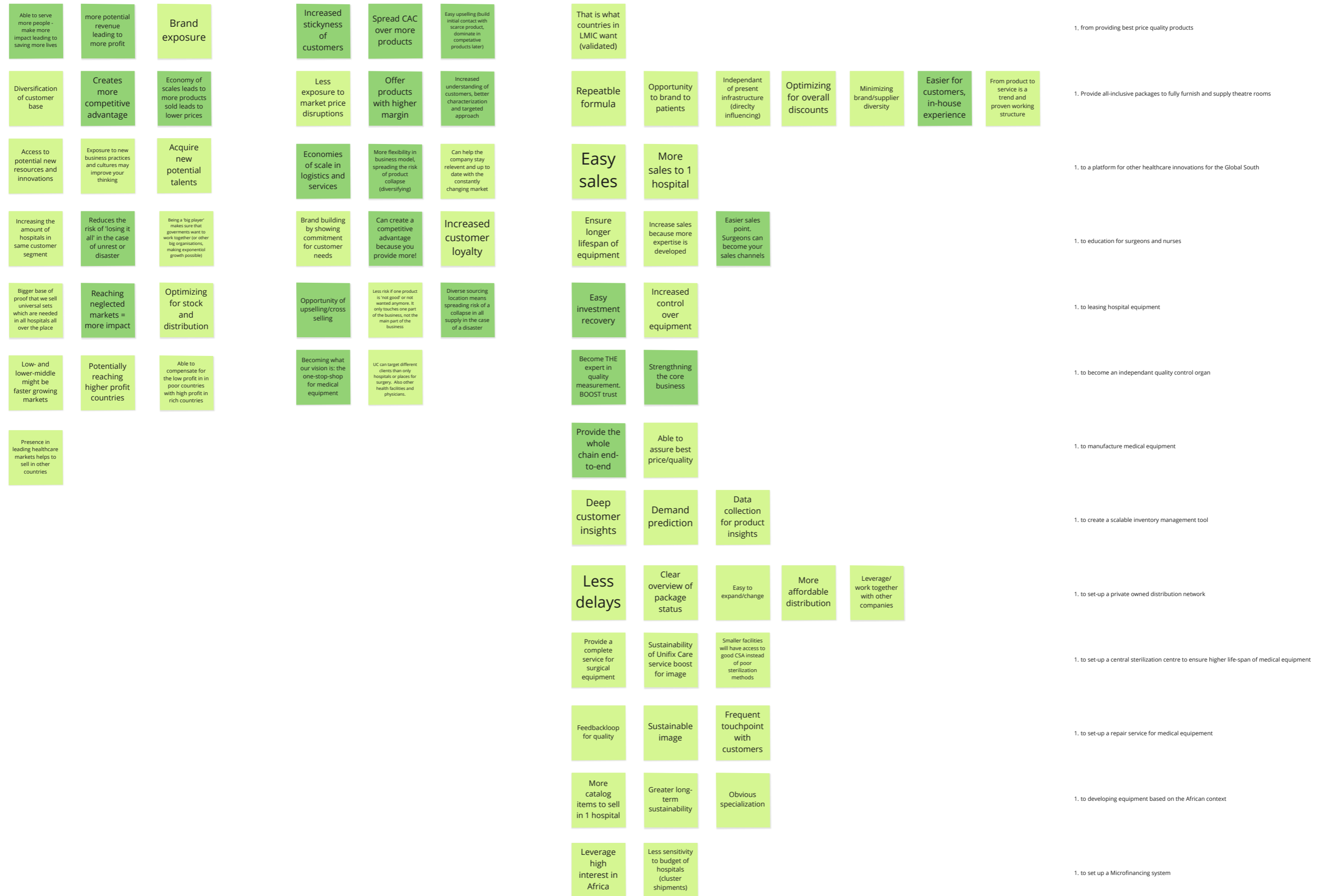
#### Limitations

It was for intended for each category to include steps of expansion into this analysis. Therefore these steps were created to use during the brainwriting. The time was too limited to include this in the research.

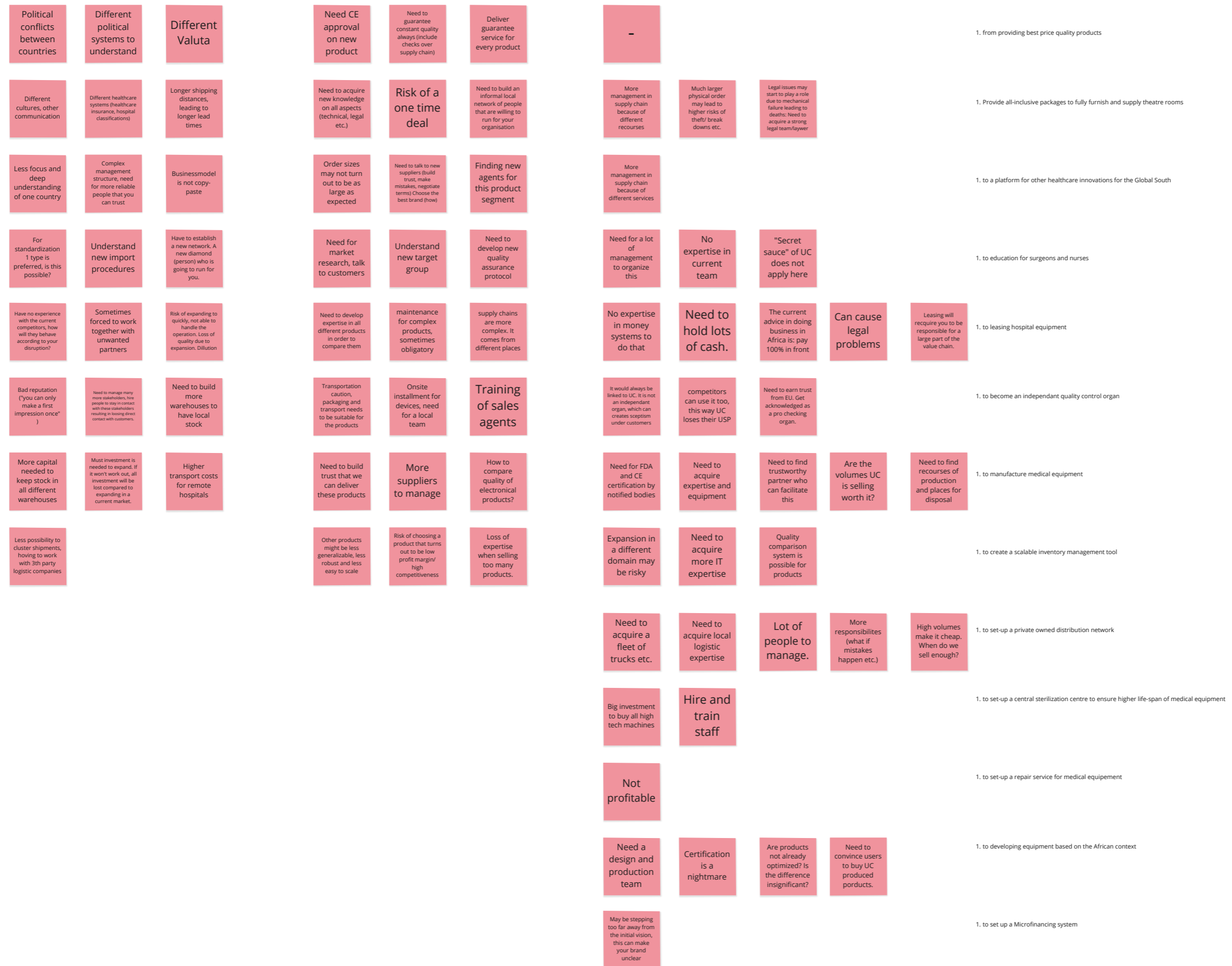
#### Conclusion

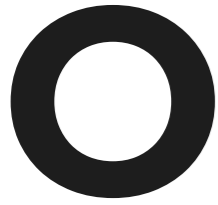
This chapter has emphasized the significance of understanding and anticipating both intended and unintended consequences associated with expanding into different categories. By conducting a brainwriting session, valuable insights into the potential benefits and risks of each expansion category were generated. These insights were then translated into a rubric, providing a clear framework for assessing factors and outcomes.





• to set up a Microfinancing system





# Strategic questionnaire

## Product catalog

### 5 External factors to take into account

#### Information Analysis

Intellectual property

Regulatory requirements

Easy to acquire knowledge

Simple product

Quality standards

#### Customer needs

Impact on customers

Impact assessment

#### Sales Analysis

Cash flow

Cost-effectiveness

Sales projections

Financial viability

#### Ease of adoption

Integration with existing technology

Usage of same distribution channels

#### Market Analysis

Market need

Market competition

Total addressable market

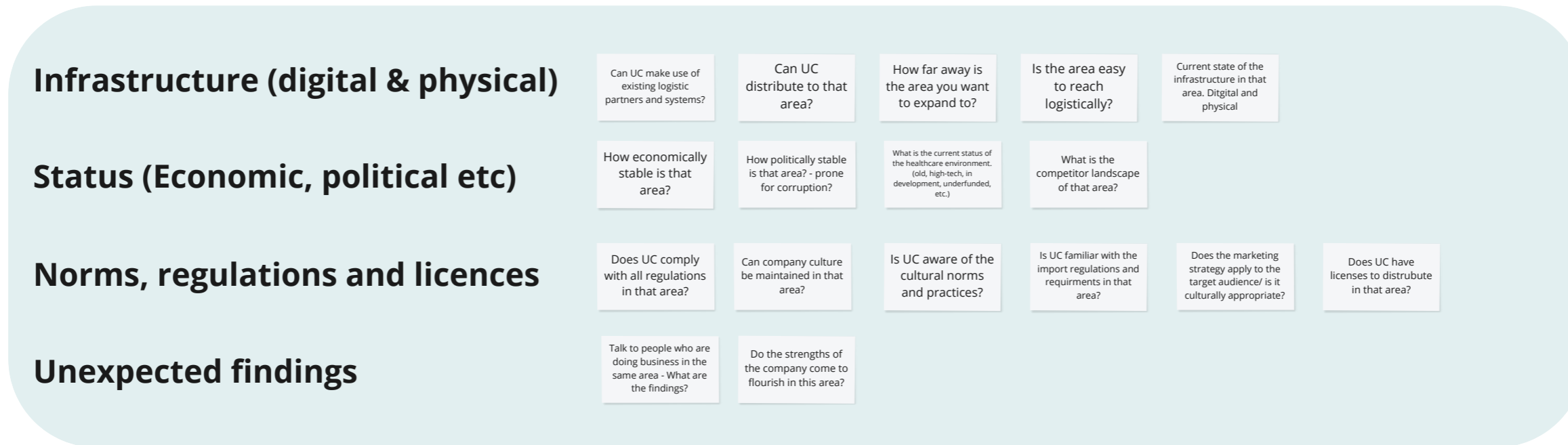
#### Current processes & products

Is it complementary on the current product line?

Does it target the same customers?

**Target area**

**External factors to take into account**

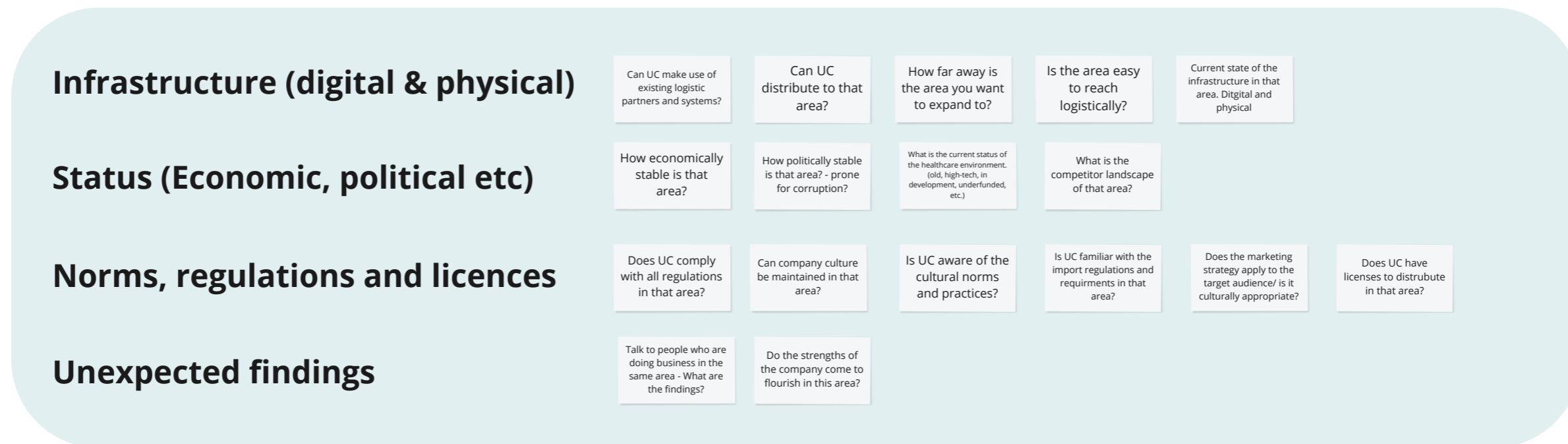


**Internal factors to take into account**



## Value chain

### External factors to take into account



### Internal factors to take into account



