

Creating Affordable Access to Medical Equipment in Africa USING SYSTEM DESIGN

March 13, 2017
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Agenda

1. Introduction
2. Healthcare in Africa
3. Medical Device Challenges
4. Existing Approaches
5. Idealized Design Framework
6. Implementation Pilot
7. Implementation Insights
8. Next Steps
9. Questions

Healthcare in Africa

1 billion
Population

50,000*
Health Facilities

<5%

of GDP is spent
on healthcare in
most African
countries

71%

Of global
communicable
disease burden

Most of the continent is *still*
underserved with regards to
medical devices

20%

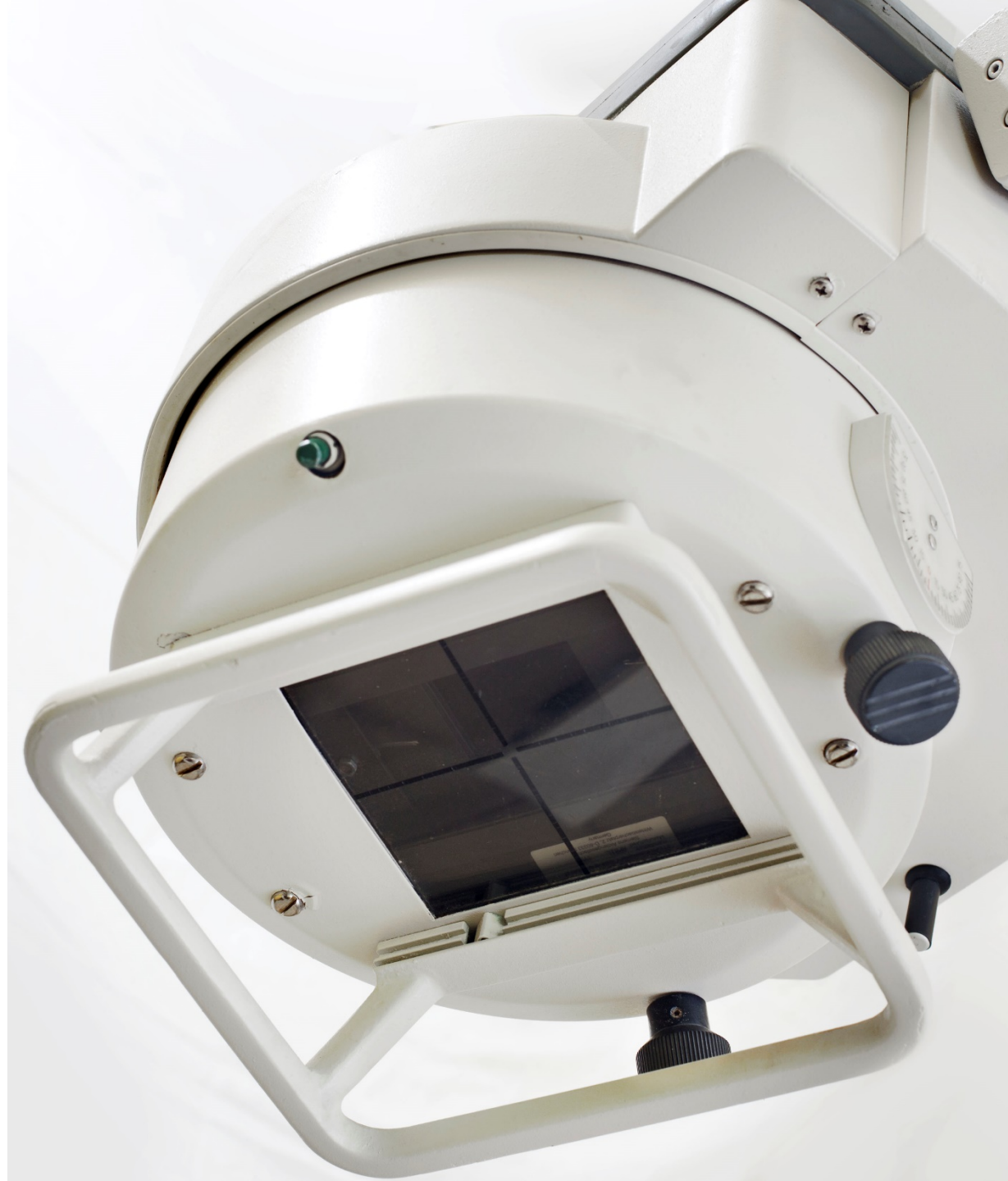
Of health spending is
public

*“patchwork of meagre public spending,
heavy reliance on foreign donors and
a large dependence on out-of-pocket
contributions and user fees that place
the greatest burden on the poorest
members of society.” – The Economist*

* Estimate

What is a medical device?

“An article, instrument, apparatus or machine that is used in the prevention, diagnosis or treatment of illness or disease, or for detecting, measuring, restoring, correcting or modifying the structure or function of the body for some health purpose.”



Types of Medical Equipment



CONSUMABLES



MEDIUM COMPLEXITY DEVICES



FURNITURE & ACCESSORIES



COMPLEX, LONG-LIVED DEVICES

Medical Device Challenges in Africa

High-quality life-saving medical devices are inaccessible to the vast majority of health facilities in Africa.



40%

of equipment of equipment physically in possession of low-resource hospitals all over the world is not usable.

(Perry and Malkin, 2011)

41%

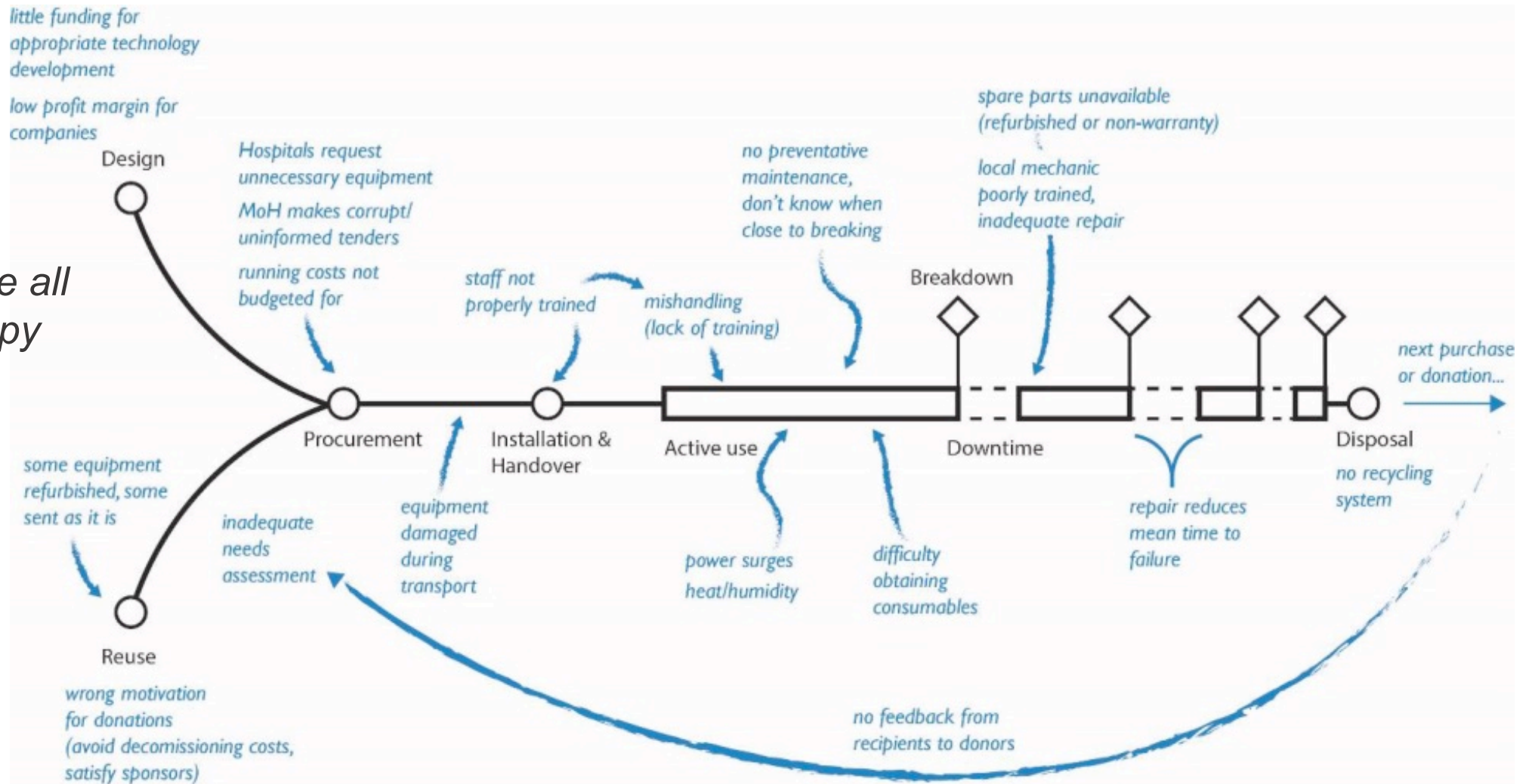
of equipment of first level hospitals studied in Nigeria did not have a functioning radiograph

(Global Surgery 2030)



Photo credits: Gradian Health

Lifecycle of a medical device in Africa



“Happy families are all alike; every unhappy family is unhappy in its own way.”

- Leo Tolstoy, Anna Karenina

Medical Devices Challenges

Africa's Medical Equipment Unavailability

High capital cost

Lack of financing options

Poor service support

Low profit margin

Low-income Patients

Low health insurance penetration

Macroeconomic conditions

Banks don't understand the medical device industry

Trust deficiency

Lack of expert biomedics

Lack of spare parts

Lack of training

Existing Approach

- Equipment Donations
- Equipment Subsidies
- Adhoc Equipment Purchases
- Frugal Innovation from US/EU OEMs
- Low-cost equipment from low-cost manufacturers

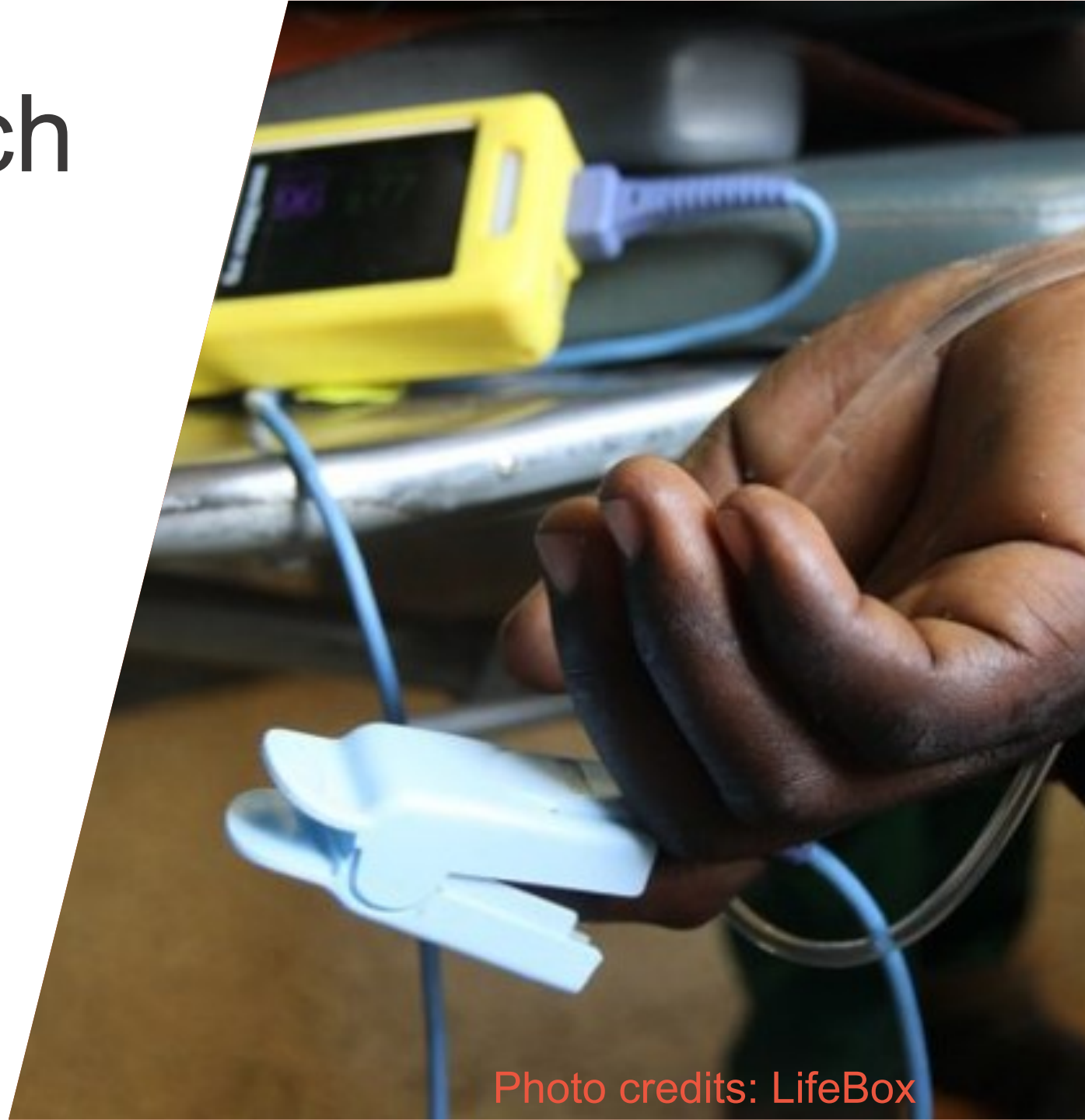


Photo credits: LifeBox

Equipment Donation



PROS

- Free for end users
- Tax rebate for donors
- Donors feel good about social impact

CONS

- Distort local medical devices market
- Little or no service support provided
- Poor product fit
- Regulatory Issues since NGOs are not local to places to donated to.
- Lack of understanding of local health context
- Many private facilities cannot get donations
- Not sustainable or scalable
- Contributes to the equipment graveyard

Equipment Subsidies

These organizations supply high quality equipment at discounted prices to hospitals.

PROS

- More affordable
- Available to both private and public hospitals
- Strong product fit
- Availability of service support via local partners

CONS

- Hard to scale because of “subsidies”
- Even with subsidies, this equipment is still unaffordable for many small and medium private hospitals



Adhoc Equipment Purchases

Individual hospitals reach out to independent medical equipment dealers across to globe to provide used or refurbished equipment.



Lead users?

PROS

- Hospitals get equipment at US secondary market retail prices

CONS

- Trial and error process: No prior equipment vetting
- No service support provided
- No spare parts provided
- The clients are usually not equipped to deal with shipping and logistics
- Only available to mid-income level hospitals

Frugal Innovations

New product development to provide cheap equipment to low income countries. This is done by stripping down features or redesign products in a new way. Optimizing for price doesn't always translate to on-the-ground success.

PROS

- If successful, it will result to cheaper product

CONS

- Long product development times with no guarantee of success
- Many projects never scale globally
- Capital intensive to redesign all pieces of equipment that is needed
- Hospitals prefer full-featured equipment rather than stripped down devices



Low-Cost Equipment from Low-Cost Manufacturers

Manufacturers in SE Asia offer low-cost products targeted at Africa.

PROS

- Cheaper than US OEM alternatives
- Readily available in the market

CONS

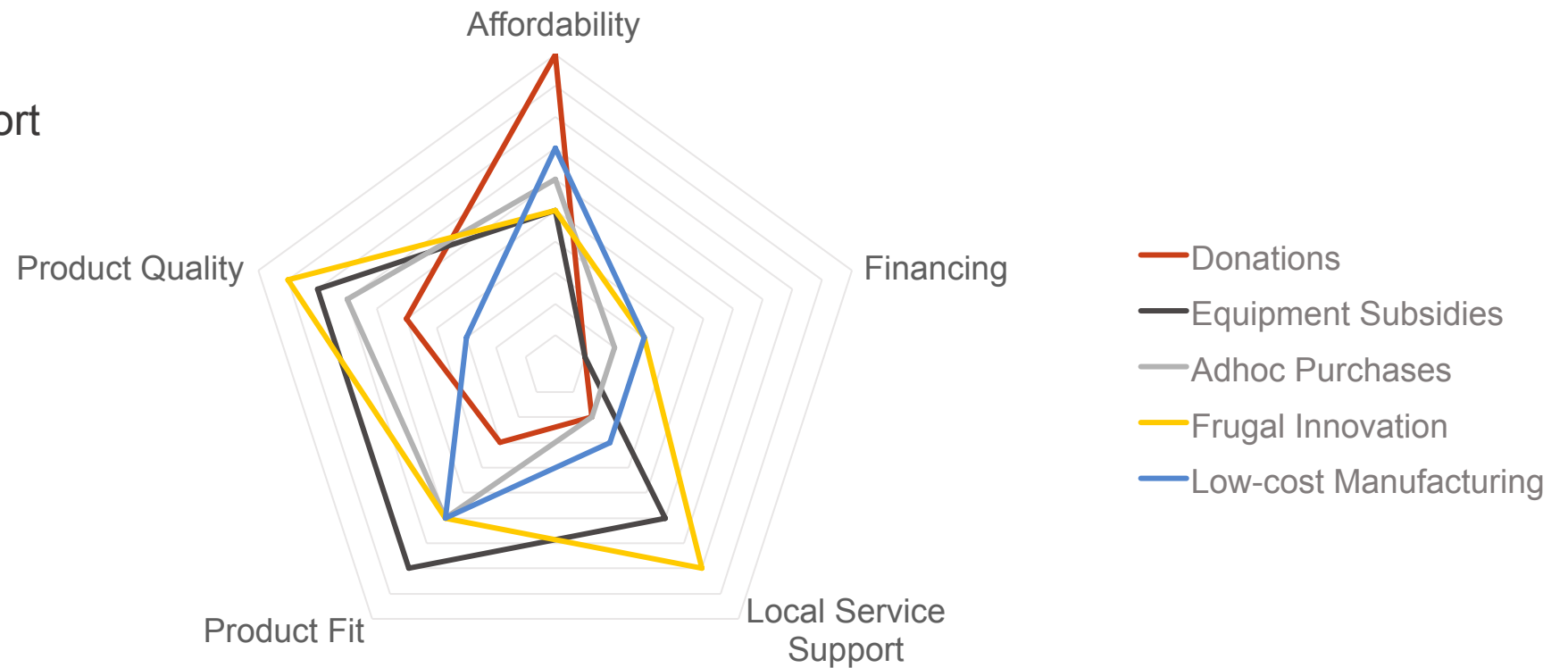
- Breaks down easily
- No service support available in country
- Poor product fit
- Non-standardized parts
- Hard to find spare parts for repair



Trade Space of Existing Approaches

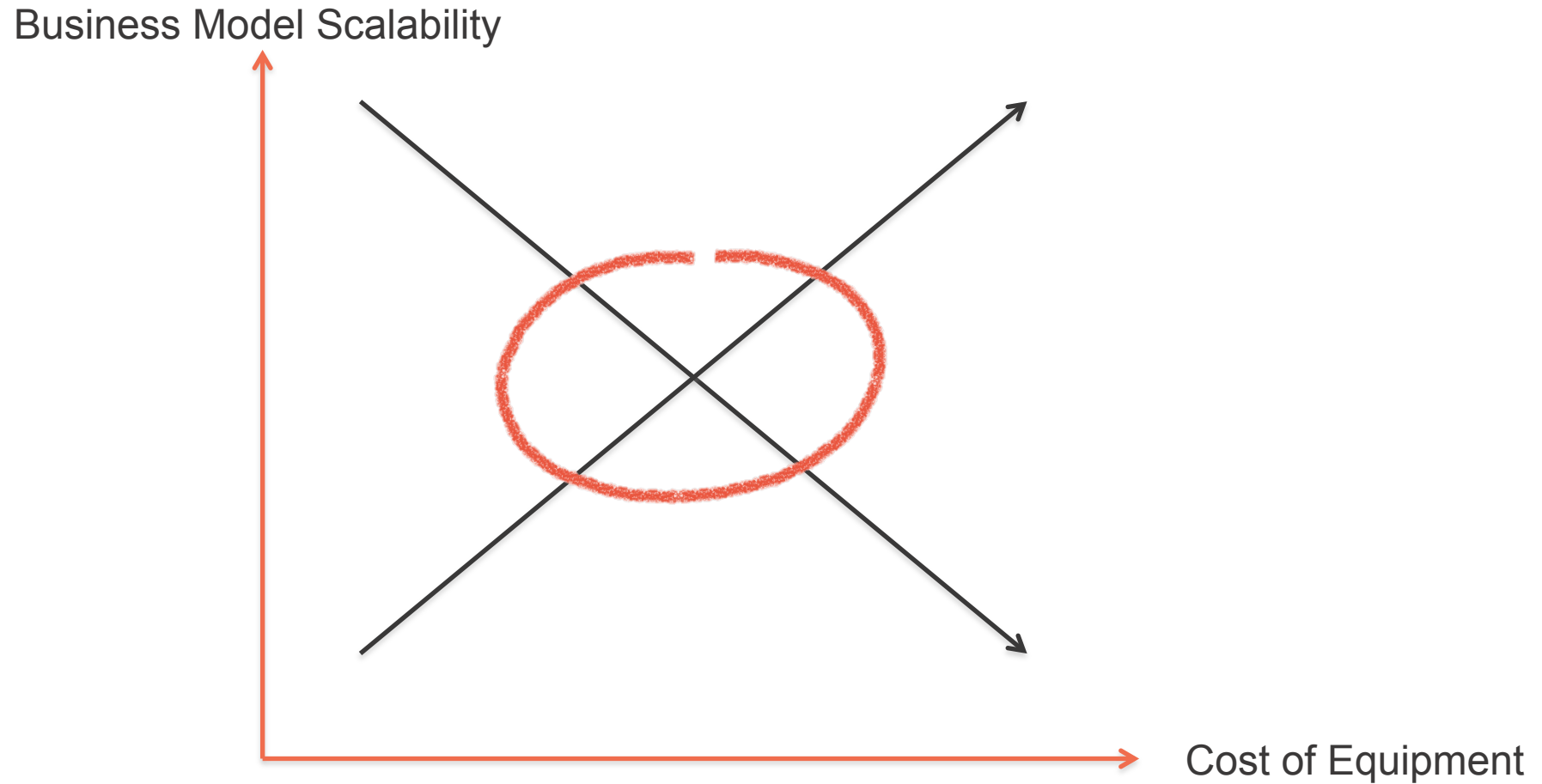
Five factors to achieve “scalability”

- Affordability
- Financing
- Local Service Support
- Product Quality
- Product Fit



Grace Kane, Designing a Product-service for repair & maintenance of medical imaging equipment in Africa, 2016. (Adapted)

Is there another way?



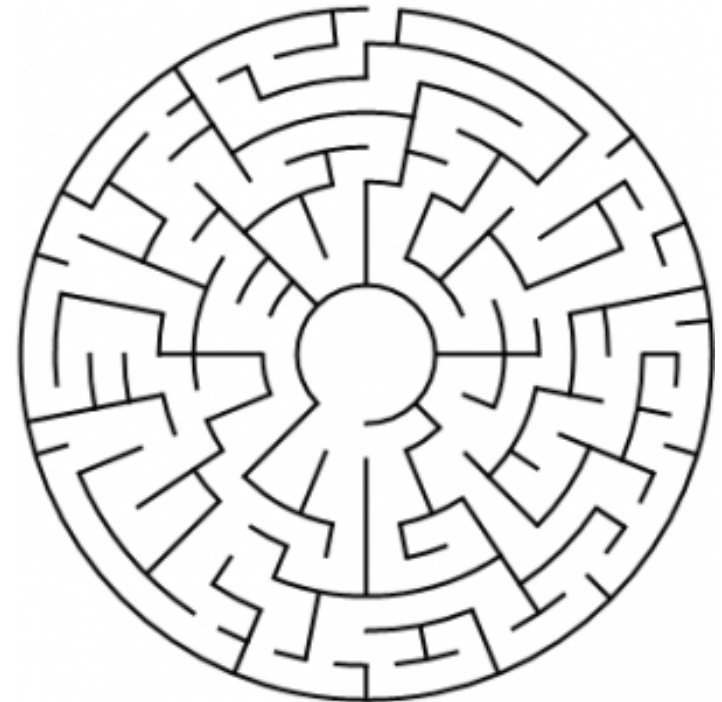
Using the Idealized Design Framework

IDEALIZED DESIGN

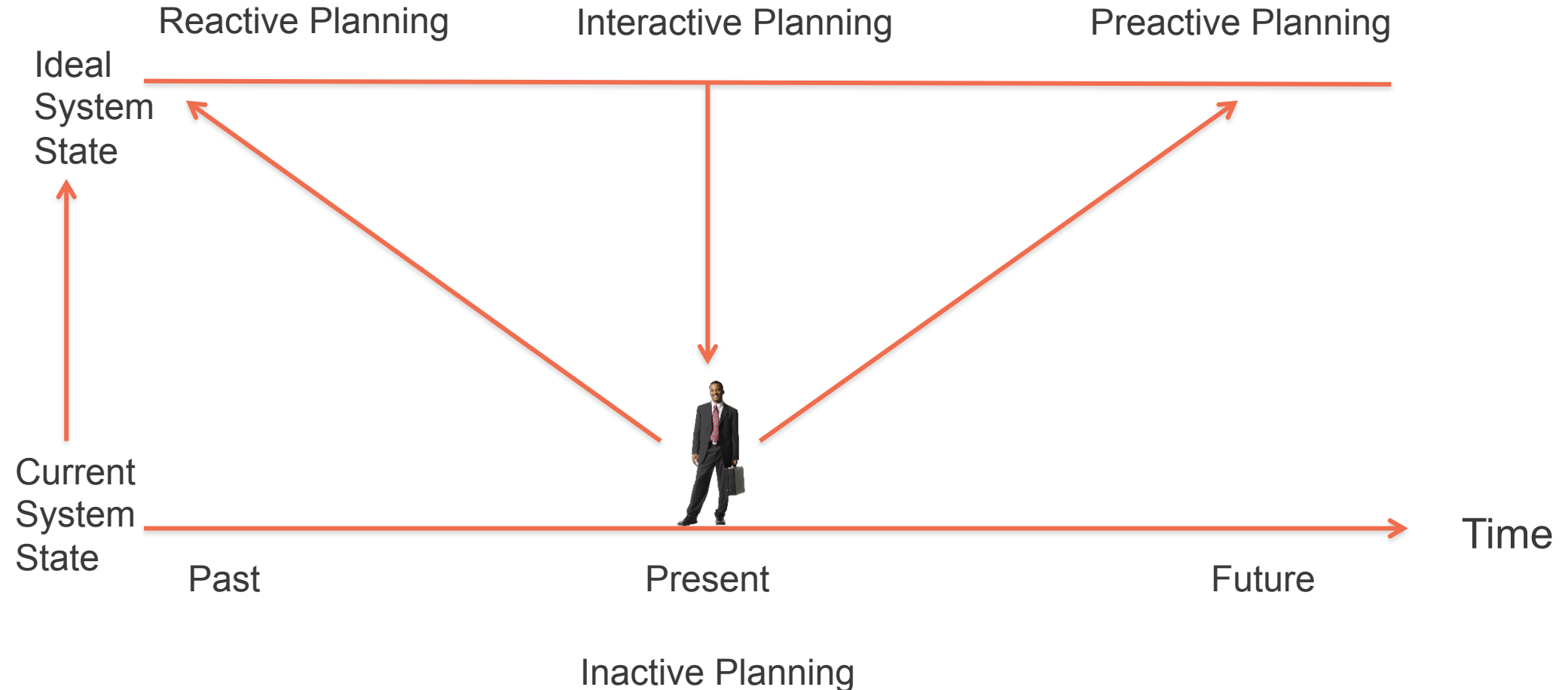
- Invented at Bell Labs
- Applied to Organization Design by Prof. Russel Ackoff
- Uses interactive planning which involves a 2-part process:
 - Idealization
 - Realization

RESTRICTIONS

- Must be legal
- Must be technically feasible

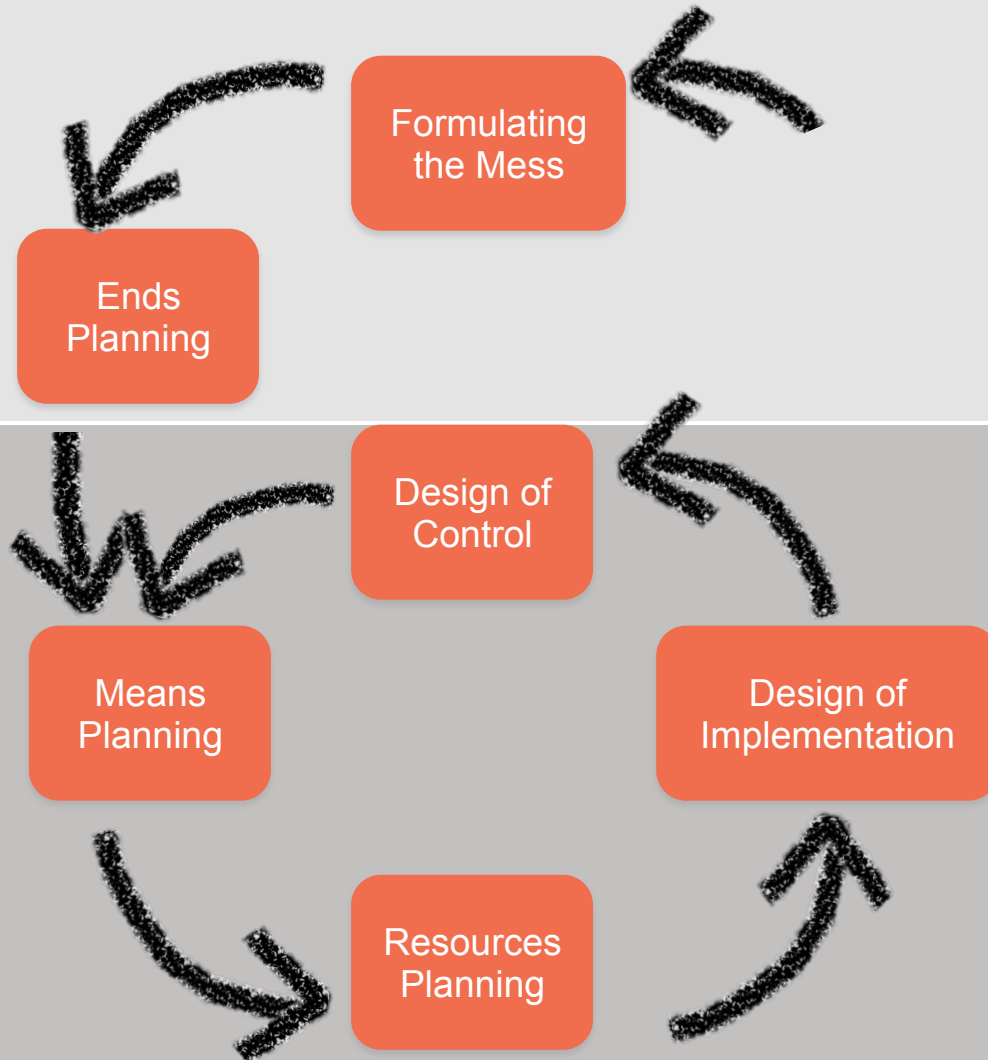


Using the Idealized Design Framework



6 Steps of Interactive Planning

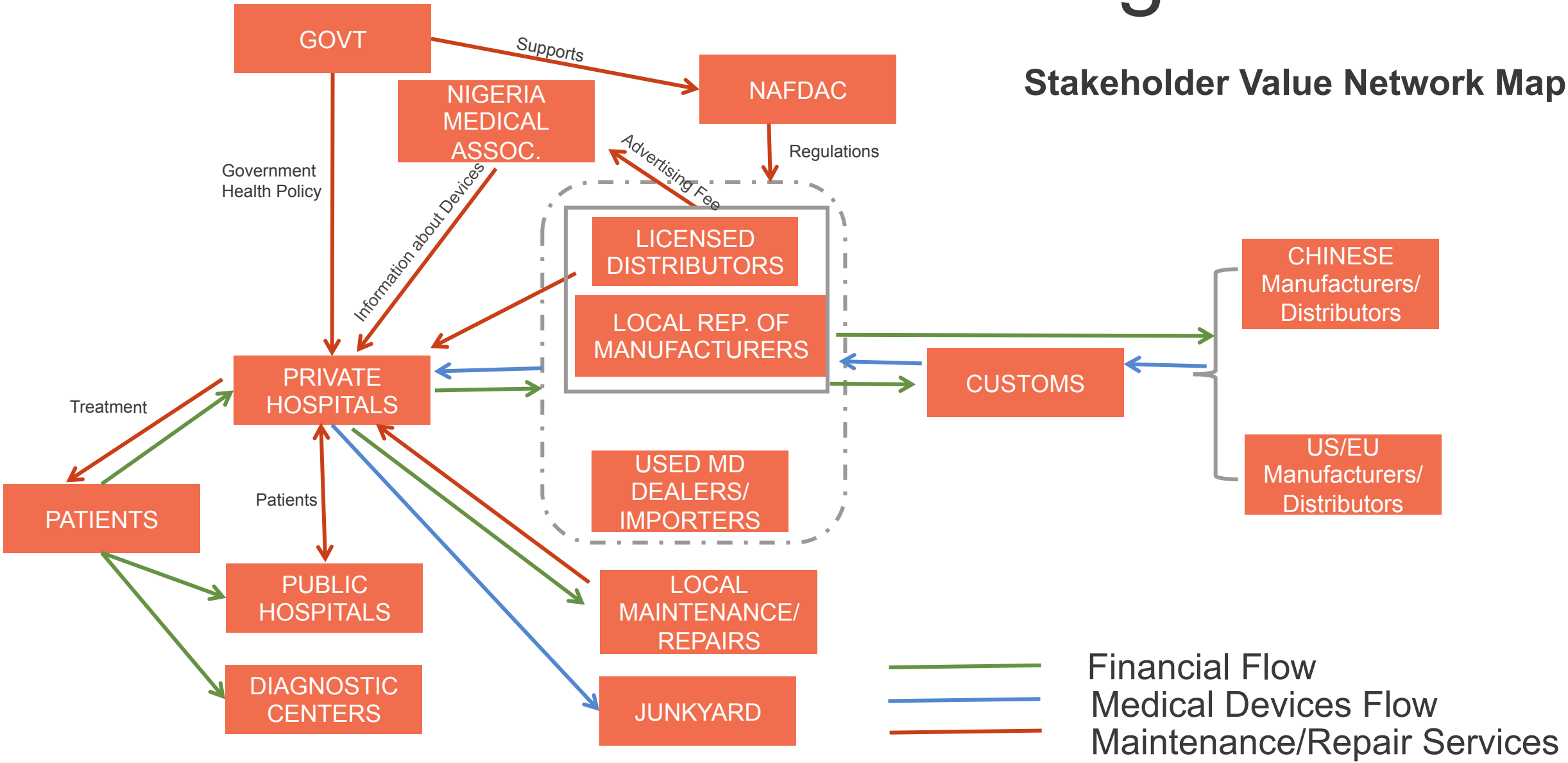
IDEALIZATION



REALIZATION

Formulating the Mess

Stakeholder Value Network Map



Formulating the Mess

Top Two Priorities of Key Stakeholders

OEMs

Profits
Govt. Regulations

Government

Political Support
Health Outcomes

Local Distributors

Profits
Logistics

Doctors

Price
Service Support

Banks

Profits
Risks

Biomedical Engineers

Access to technical resources
Training

Ends Planning

Creating an ideal medical equipment marketplace that operates across Africa

Local Presence

- Understand local hospital needs and requirements
- Understand and follows local medical devices rules and regulations

Equipment Inventory Access

- Provide appropriate equipment at affordable prices
- Has ready access to wide variety of medical equipment
- Can supply spare parts

Financing

- Provide financing/leasing/equipment rental directly to hospitals

Technical Expertise

- Provide local service support(maintenance contract & repairs)
- Access to technical resources (manuals & software)

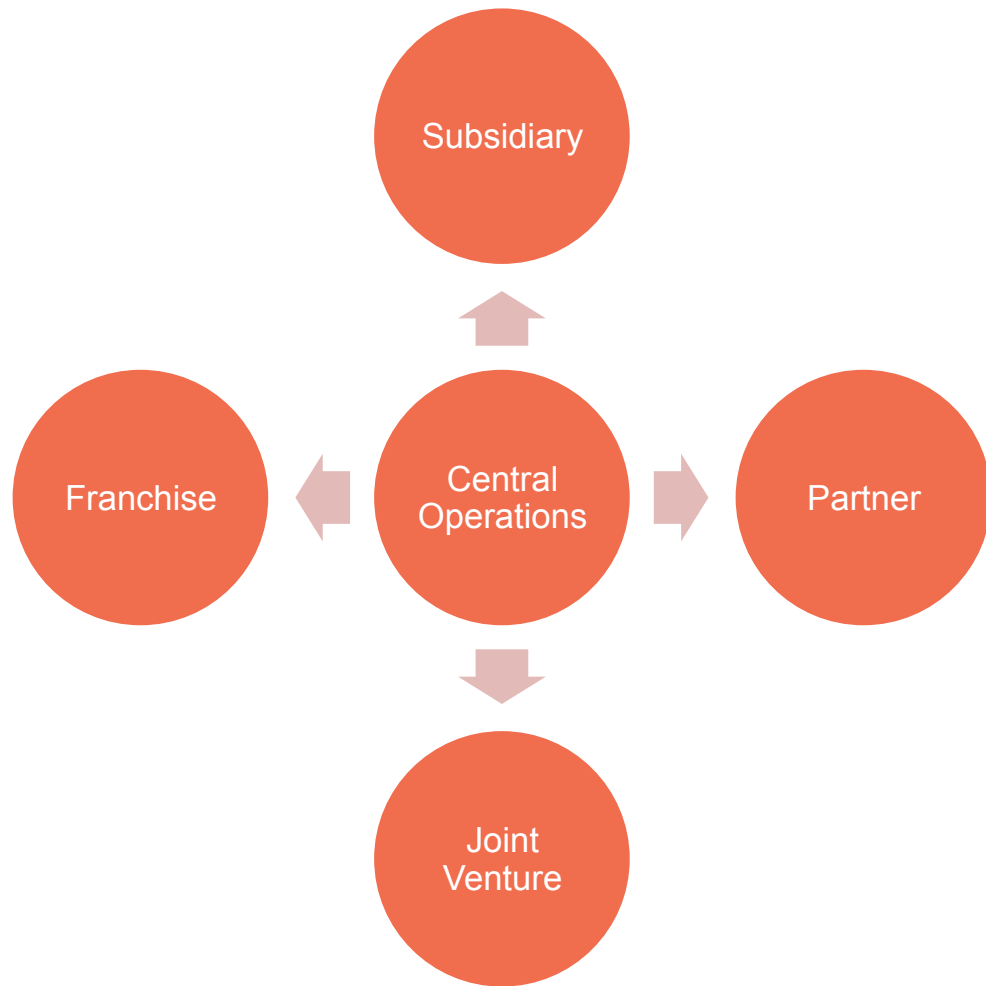
Training

- Train local biomedical technicians
- Train clinicians on use of equipment

Reach

- Can start small but must be scalable into every African country
- Has a supply chain that can reach rural and peri-urban places

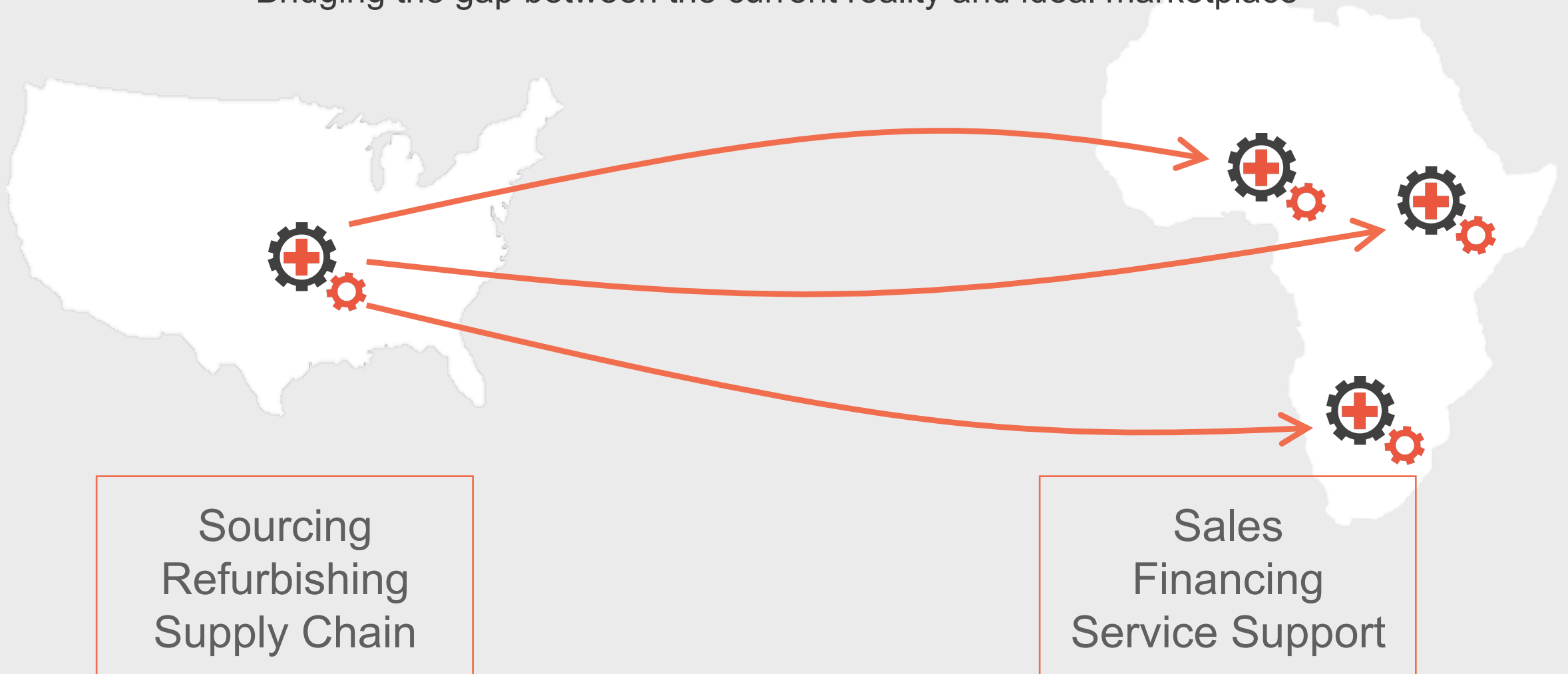
Ends Planning



21. HOSPITAL

Means Planning

Bridging the gap between the current reality and ideal marketplace



Means Planning

Why focus on USA for equipment supplies?

- High rate of equipment turnover
- Robust secondary equipment market
- Technical Resources
- Network effects



Fall River, MA



Follow

It's estimated the US health care system wastes \$765b a year, more than the entire budget of the Defense Department

propub.li/2m6S5Ro

5:54 PM - 9 Mar 2017



What Hospitals Waste

The nation's health care tab is sky-high. We're tracking down the reasons. First stop: A look at all the perfectly good stuff hospitals

propublica.org

223 185

Resources Planning

Estimate how many resources (time, capital, effort) are needed and how to allocate across different activities

EXECUTE

Supply Chain
Marketing & Sales
Business Development
Operations
Equipment Rental
Training

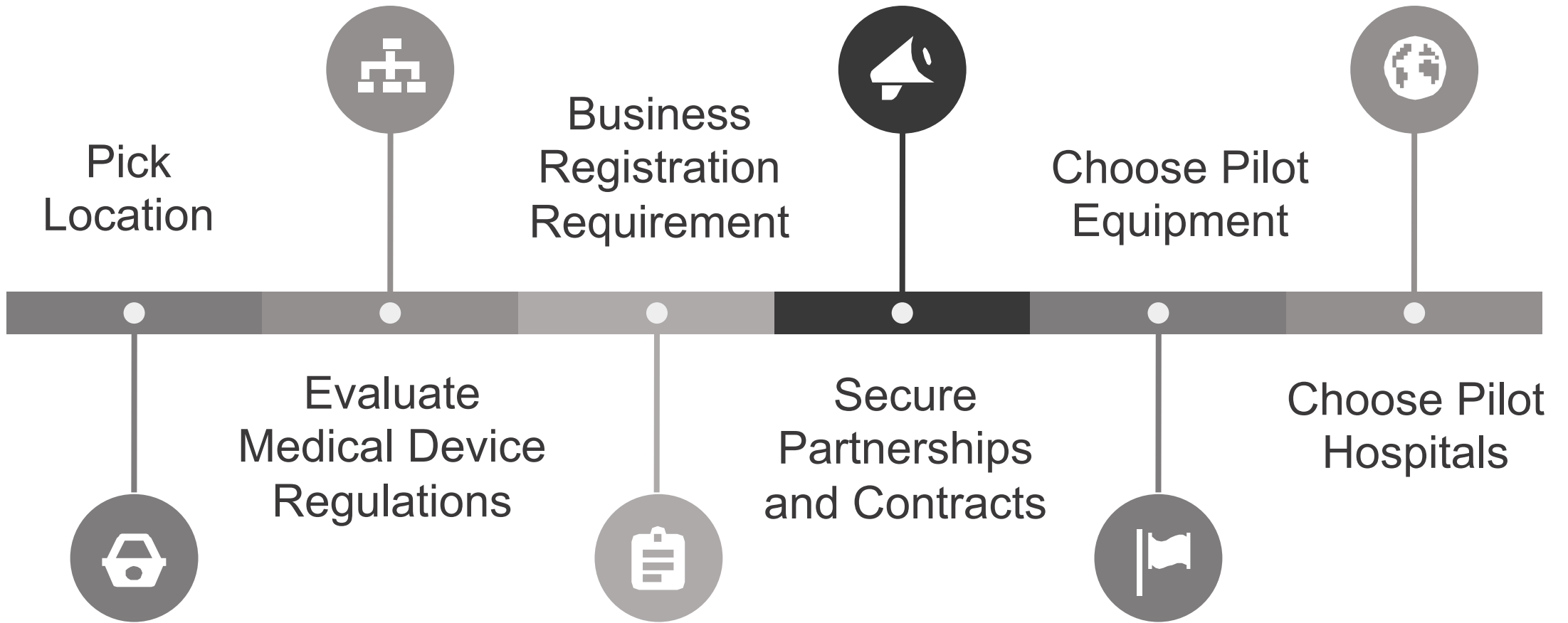
PARTNER

Equipment Financing
Equipment Sourcing
Equipment Refurbishing
Train the Trainer

CONTRACT

Biomedical Services
Taxes & Accounting
Freight

Design of Implementation





Design of Control

How do you evaluate impact aside business KPIs?

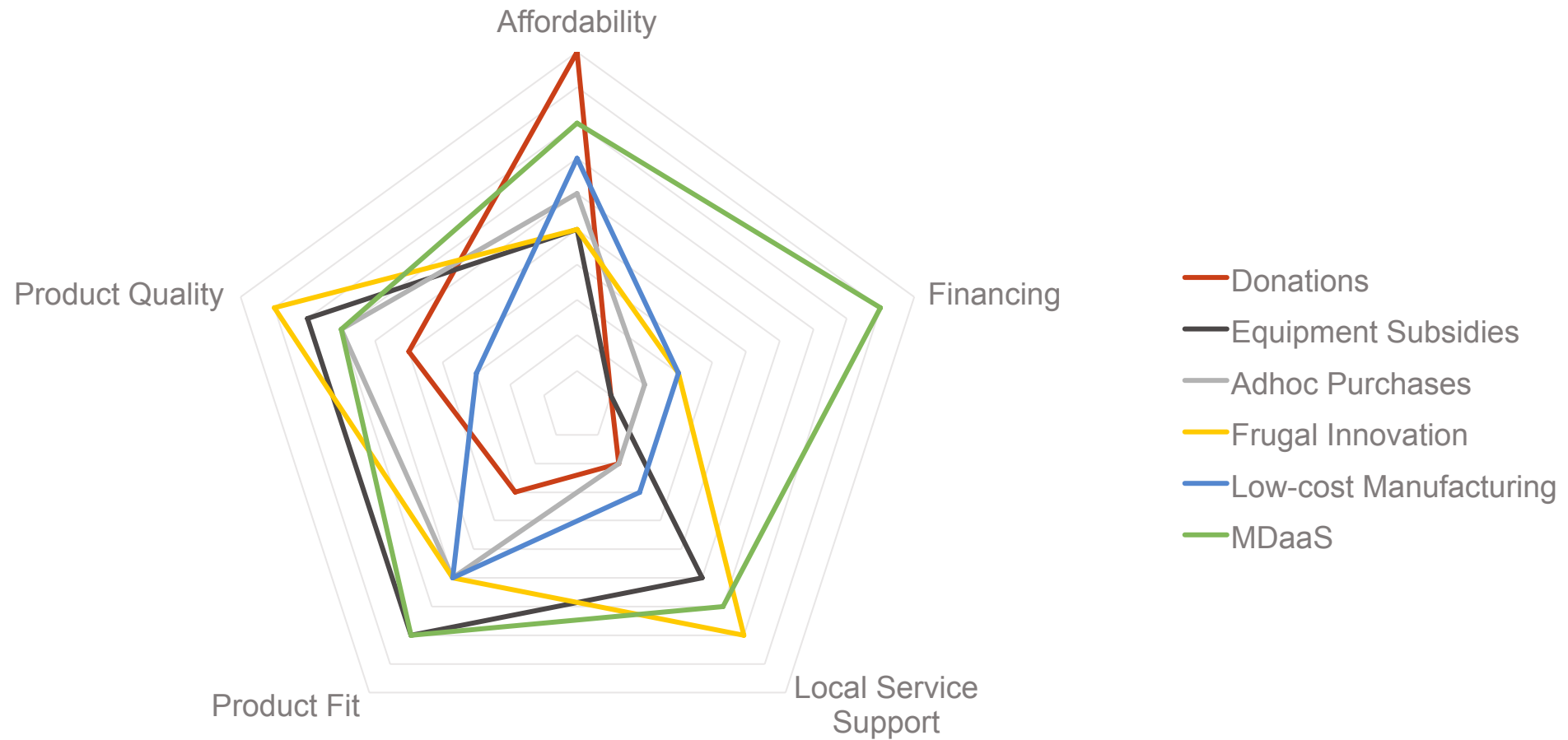
- How many health facilities we serve
- How many pieces of equipment we have in the field
- Equipment uptimes
- Number of procedures done with MDaaS supplied devices
- Time it takes to service equipment after a breakdown
- Number of devices per population



Implementation Phase

- Launched MDaaS Nigeria in Jan 2016 with 3 pilot hospitals which later expanded to 6.
- Revenues of > \$100,000 in the first year of operation in Nigeria
- Won healthcare innovation awards in Nigeria and US
- Secured partnerships with Independent med devices companies in the US and a financing company in Nigeria
- MDaaS-supplied devices has been used in 5,000 procedures and counting

Trade Space with MDaaS



What does MDaaS offer?

“United Rentals” for medical equipment in Africa



High Quality Equipment

Refurbished
Lower price/feature
Best market fit



Flexible Acquisition Options

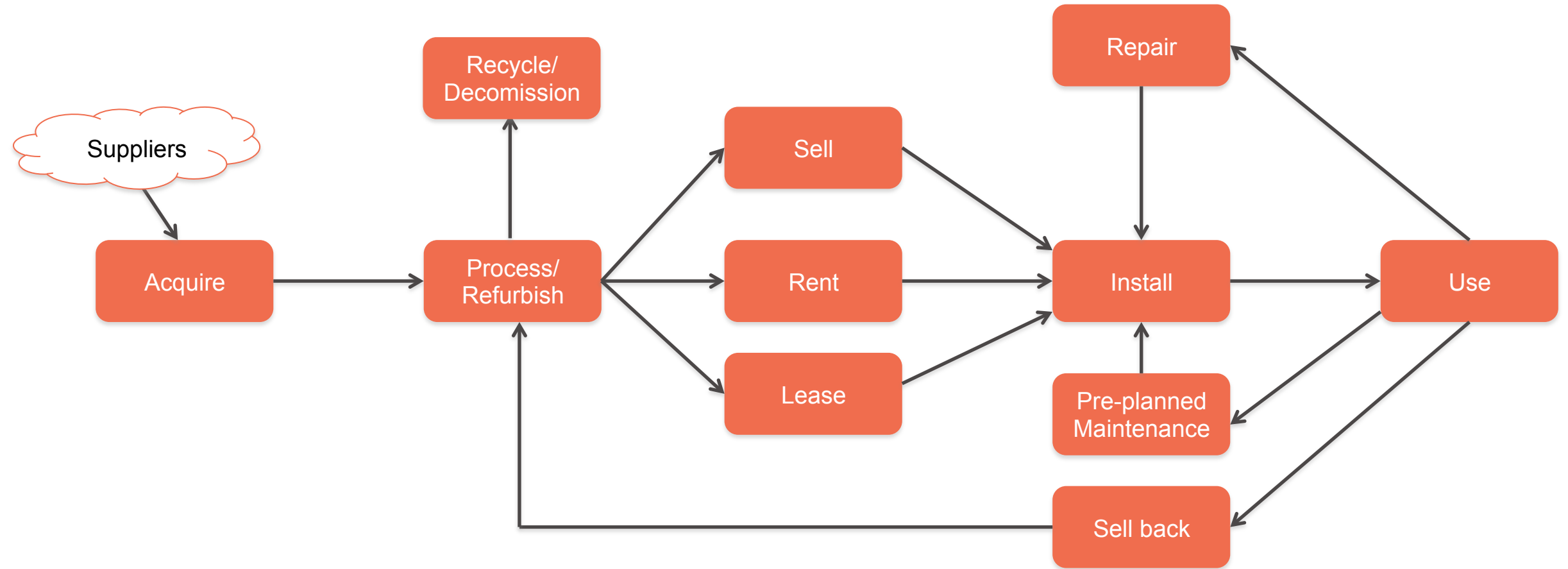
Direct Sales
Payment Plans
Leasing
Equipment Rentals



Service Support

1-year warranty
Free installation
Maintenance & Repair
Customer support

Lifecycle of an MDaaS Device



Implementation Insights

- Tough macroeconomic conditions slowed down implementation
- Relationships matter
- Access to technical resources is very important
- Standardize processes as fast as possible





Next Steps

- Transition from pilot operations to full operations
- Fundraising
- Build out training component

Thank you!

Special thanks to the MDaaS Team

Joe McCord
Opeyemi Ologun
Genevieve Barnard

and

Grace Kane for her excellent research
into medical devices in Africa

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