CHALMERS INDUSTRITEKNIK

Infection and contagion-proof care facilities in low-income countries

A project financed by Formas

www.cleansurgeair.se

John Charnley, an English orthopaedic surgeon

FACT The risk of infection after surgery is reduced with good air quality during knife time

Charnley's and others' discoveries resulted in requirements, guidelines and advice for achieving good air quality in operating theatres

Teknisk specifikation
SIS-TS 39:2015

SWEDISH STANDARDS INSTITUTE

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Mikrobiologisk renhet i operationsrum – Förebyggande av luftburen smitta – Vägledning och grundläggande krav

Microbiological cleanliness in the operating room – Preventing airborne contamination – Guidance and fundamental requirements

Follow the guidelines, and you might end up with an operating theatre looking like this

Today's operating rooms require large, expensive, complex HVAC installations with high operating costs.

This is possible in hospitals in high-income countries…

… but it is not realistic in most hospitals in low-income countries

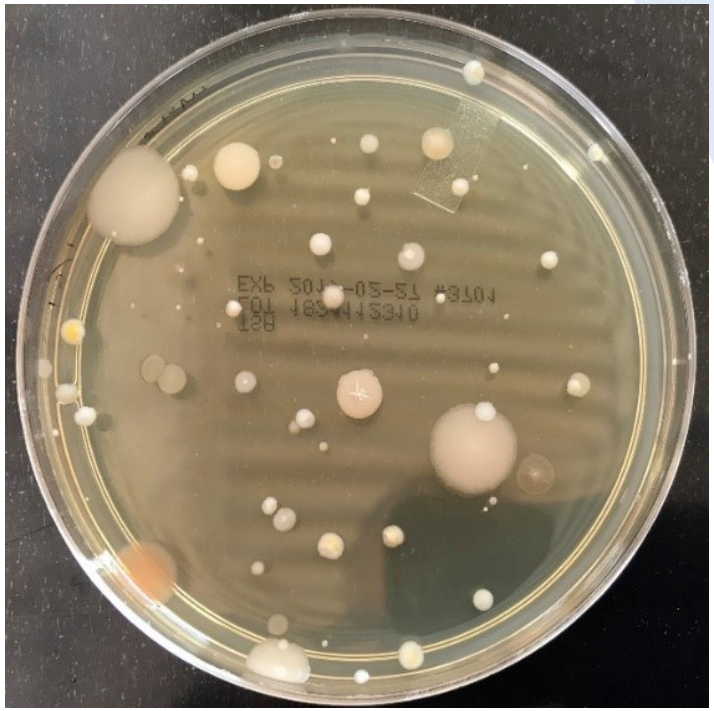
Operating theatre in a hospital in southern Chad

PILOT STUDIE - 2019

An alternative technology solution was tested at a rural hospital in southern Chad.

No other safety ventilation

Air cleaners



Results from the pilot study in Chad

Reduction of particles: 75-95%

Reduction of CFU: 55-60%

Good start!

But still >> limits (Swedish guidline)

THIS PROJECT

Infection and contagion-proof care facilities in low-income countries

Time: 2023 – 2025
Budget: 3 million SEK

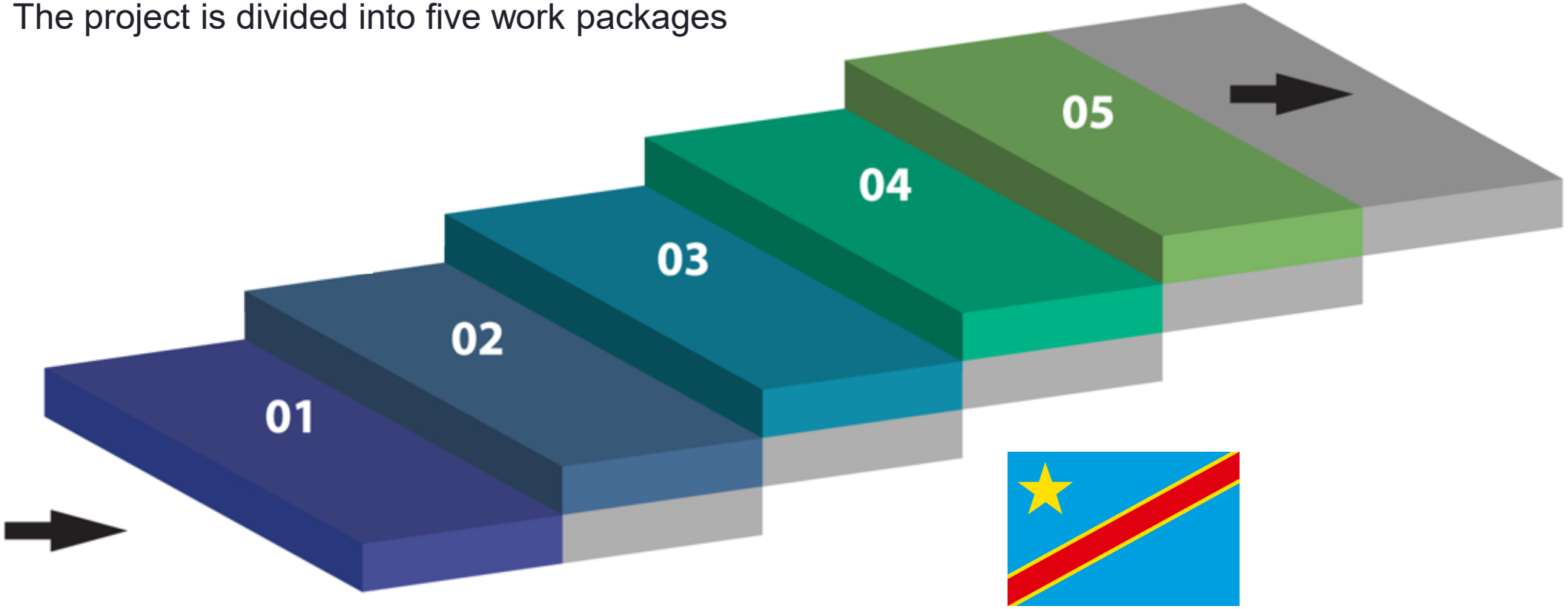
FORMAS statement of the assessment

1. Insufficient
2. Poor
3. Acceptable
4. Good
5. Very good
6. Excellent
7. Outstanding

Scientific question	6
Method and implementation	6
Scientific competence	7
Social benefit and communication	7
FINAL ASSESSMENT	7

FORMAS

The project is divided into five work packages



WP 1
Project start
Q1-Q2 2023

WP 2
Tests in laboratories
Q3-Q4 2023

WP 3
Tests in other premises
Q1-Q2 2024

WP 4
Tests at two hospitals in DR Congo
Q4-Q1 2024/25

WP 5
Dissemination of knowledge and reporting
Q2-Q4 2025

Working group

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Suppliers and product developers

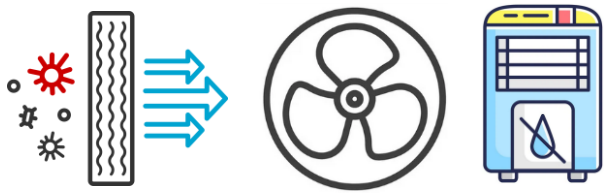
- Light Air

WP 1

Project start and tests of individual devices

Q1-Q2 2023

- Regulatory mapping and identification of barriers
- Overall criteria/target values (noise, space, cost, air quality, etc.)
- Identification of influencing factors (routines, clothing, leakage, ventilation, etc.)
- Criteria for individual devices
- Measures/technology against power outages and voltage drops
- Measurement methods, measurement plan, evaluation
- Procurement of individual devices
- Preparation of the relevant test environment (laboratory)
- TEST Individual devices (performance, sound, electrical power, radiation, etc.)
- Analysis of old filter from pilot study in Chad
- Preliminary design and dimensioning of technology set-up
- Compilation of Step 1

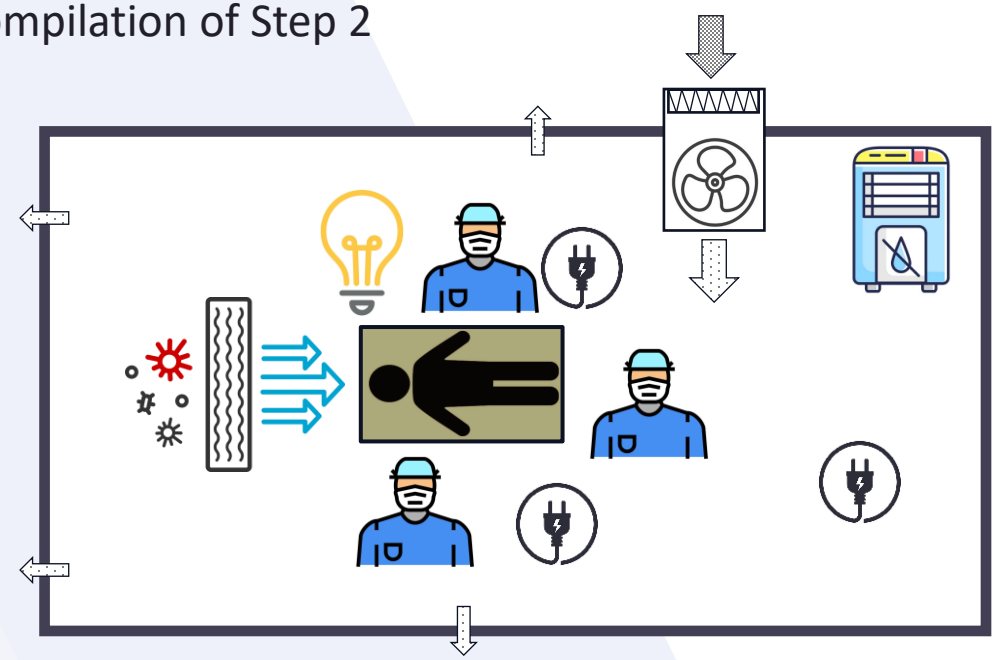


WP 2

Test of entire technology setup in laboratory

Q3-Q4 2023

- Determining of other factors to be included in the concept
- A preliminary dimensioning model for the technology set is developed
- Required air cleaner capacity is procured
- Relevant external circumstances and disturbances are determined
- Measurement plan and criteria for technology set-up are established
- TEST Entire technology setup with selected devices, no disturbances
- TEST With disturbances
- The dimensioning model is updated
- Compilation of Step 2

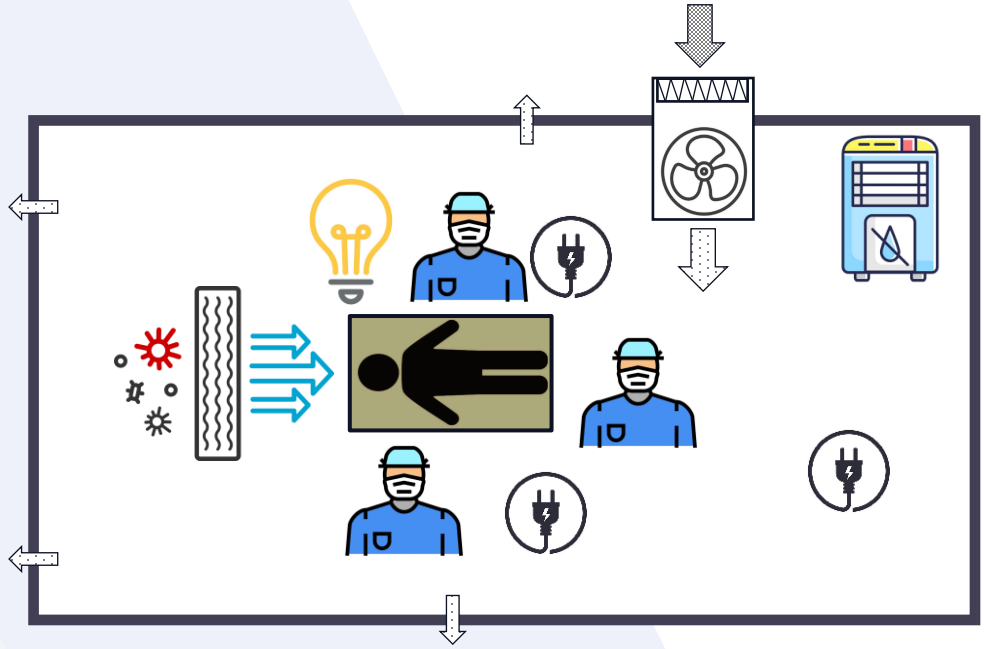


WP 3

Full scale tests in different premises (Sweden)

Q1-Q2 2024

- Choice of premises (design, size, installation technology, etc.)
- A technical solution for each room is developed with the dimensioning model
- Dialogue with receivers in DR Congo about personnel, room design, etc.
- TEST Full scale technology set, incl. interference
- Dimensioning model is updated
- Information materials are produced (function, maintenance, clothing, etc.)
- Compilation of Step 3



WP 4

Tests at two hospitals in DR Congo

Q4-Q1 2024/25

- Dialogue and preparations with recipients regarding dates, number of operations, etc.
- Planning with the dimensioning model
- Procurement of more devices, incl. transport protection
- Measurement plan is established
- Installation in hospital #1 and #2
- Review of information material with staff
- TEST In hospital #1 and #2
- Reporting of preliminary test results on site with hospital management
- Possible return trip incl. new tests
- Final version of information material (English + French)
- Compilation of Step 4

WP 5

Dissemination of knowledge and reporting

Q2-Q4 2025

- Compilation in technical report
- Two scientific articles (Steps 1-3 and Step 4)
- Conference (Kirurgiveckan, Sweden)
- Popular science article (Läkartidningen)
- Seminar with Swedish potential end users (The Swedish Civil Contingencies Agency, The Public Health Agency of Sweden, Swedish Armed Forces, etc.)