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# Efficiency for Access Design Challenge Technology Week: Webinar 1: Space Cooling



## EFFICIENCY FOR ACCESS



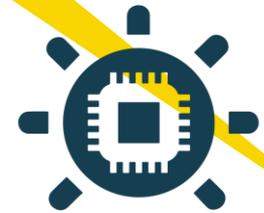
### Ulysses De Waegemaeker

- Mechanical engineer at Solaris Offgrid

HQ in Valencia Spain

- Industrial Designer originally from Argentina

- Develops new products through the Pay as you go (**PAYGO**) method.



SOLARIS  
OFFGRID



### Richard Atwal

Director of the PSH Group

- Leading design and manufacturing company head-quartered in Hong Kong

- Manufacturing facilities in China and offices in London

- **Renewit (within PSH Group)** designs and manufacturers a range of solar power and lighting solutions



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# **Ulysses De Waegemaeker**

**Mechanical engineer at Solaris  
Offgrid**

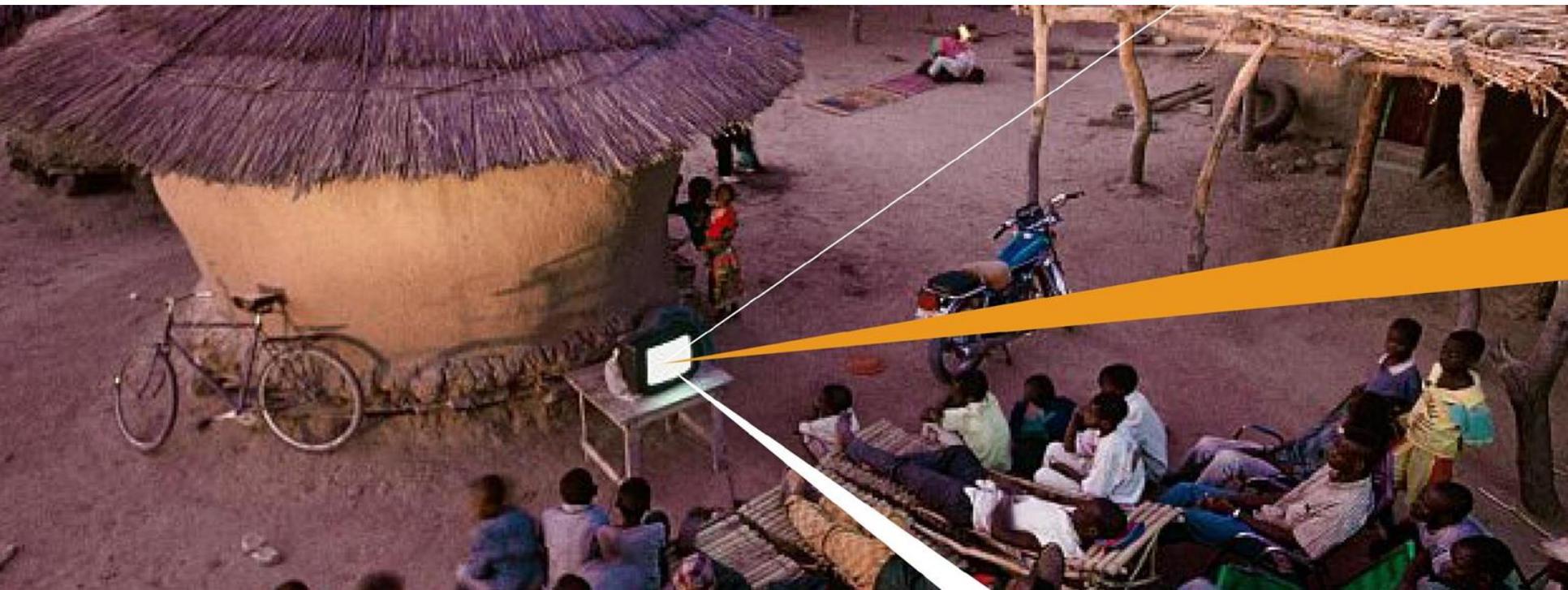




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# Space Cooling Market Insights

Industrial Designer: Ulysses De Waegemaeker



# Space Cooling in Sub-Saharan Africa

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## State Of Market

- Market Demand
- Current Solutions
- Current Problems
- SDG's
- Market Direction
- Past Lessons
- Cost

## Designing For People

- Users Need
- Product Look
- Good Practices
- Product Sharing & Portability
- Income Generation



**State Of Market**

# Market Demand

- Solaris Tanzania Portfolio:
  - 20% use their SHS to plug cooling appliances
  - 70% of SHS deployed have the capacity to run DC fans
- Normally fans are not sold under the SHS package
- Standing fans require +50w systems
- Mostly acquired outside PAYG distribution channels



# Current Solutions

- Most affordable options range between 5 and 15 USD (small fans).
- Price can go up to 35 USD for more powerful standing fans.
- Distributors avoid appliances which require extra installations.



# Current Problems

- Efficiency (Energy consumption)
- Lack of innovation
- Reselling conventional appliances thought for other markets
- Unnecessary features
- System upscale to meet appliances demand



# SDG's

- Goal 7: Affordable & Clean Energy
  - Solar powered lifestyle
- Goal 4: Quality Education
  - Comfort at school
  - Digital tools



# Market Direction

- +1 million SHS units sold last year
- Market growth up to 70% annually
- Smart & PAYG appliances
- P2P energy sharing (micro-grids)
- Upscalable systems
- Bigger systems (+200W)



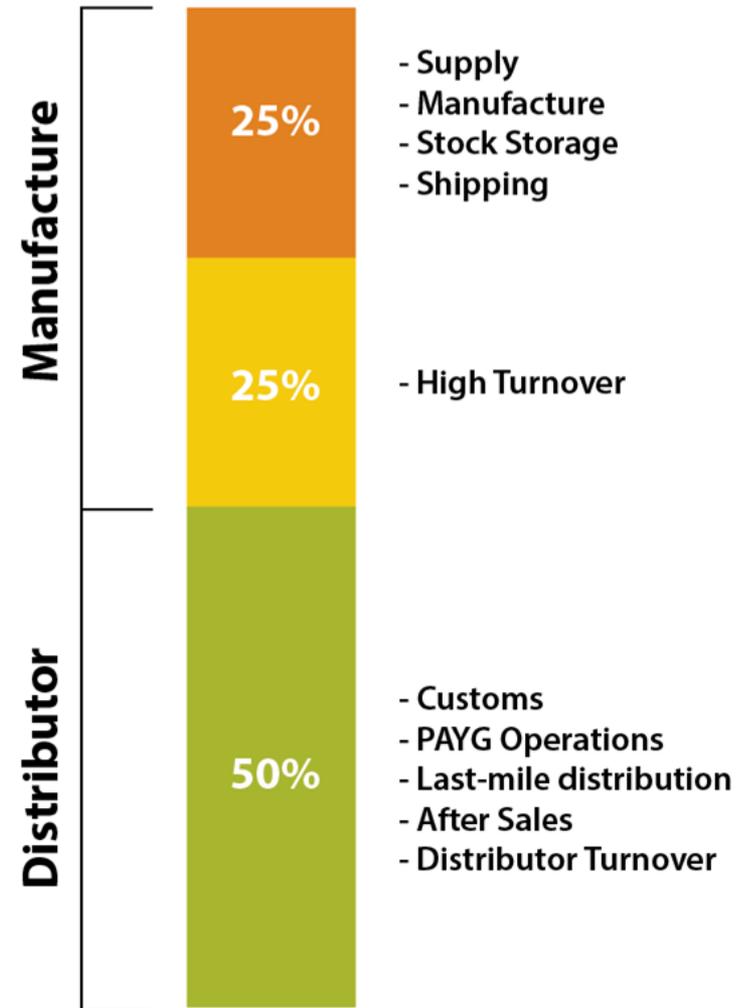
# Past Lessons

- Lifespan of products deployed
- Accurate follow up of leased product status
- Distributors covering the after sales cost of low quality products
- No refurbish strategy
- Client economic limitations



# Cost

- Competitive Price
- Bet on economies of scale (success of PICO products)
- Stages till last-mile delivery
- External tools that enable organised distribution & follow up (PAYG/ GSM connectivity)



The background is a solid teal color. A thin white horizontal line runs across the middle of the image. A thick yellow diagonal line starts from the top right corner and extends towards the center, meeting the white line. Another thick white diagonal line starts from the bottom left corner and extends towards the center, meeting the white line.

# Designing For People

# Users Need

- Indoor: “ Insulated shed with active cooling to adjust room temperature at a comfortable point”
- Outdoor: “Efficient way to obtain as much airflow as possible, to directly decrease body temperature”



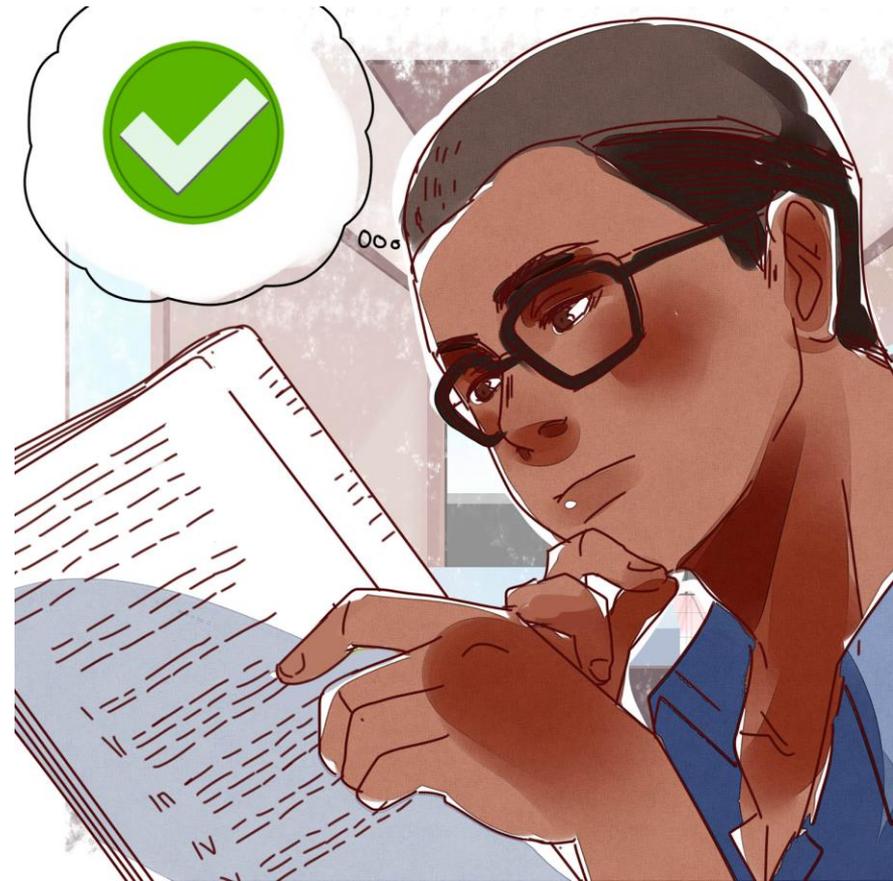
# Product Look

- Familiar
- Take into account “status builders”
- White branding



# Good Practices

- Unhackable
- Modular
- Minimal Enclosing
- Prepare for local refurbish and recycling
- Provide education & graphic descriptions
- Inclusive



# Product Sharing & Portability

- Sharing requires same connector & current output (distributors risk)
- Cultural tolerance against heat
- Portability as a selling feature



# Income Generation

- Cooling is mainly a comfort asset
- Technology as a service differentiator
- Indirect marketing
- Access alternative markets



# Quote

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“From rooster call till moonshine, empathize with users. Local experience is the biggest step towards positive energy access design..”

Ulysses De Waegemaeker, Solaris Offgrid



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**Any questions?**



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# **Richard Atwal**

## **Director of the PSH Group**



# The Market Demand

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## ➤ Benefits of space cooling

- Better living conditions
- Health benefits
- Reduced risk of mortality in heat wave conditions.
- Better productivity – not only working conditions but think small shop/bar with fan.
- Allow humanity to live in areas otherwise difficult not only say Africa but think of Dubai or California without A/C

## ➤ The market

- 800 million people completely off grid and number growing. Population growth outstripping electricity access off grid and on grid.
- Further 1+ billion people live without good quality electricity provision.
- If global temperature rises continue most of humanity will be living with severe heat as the norm.

# The Challenge

## What is the aim of this challenge?

- Design a fan for some of the lowest income homes on the planet. Price is an issue.
- To be as energy efficient as possible to work from the smallest DC power supply. Cost is not just cost of the fan but also associated power supply.
- This is a mass market challenge it needs to appeal to a wide range of customers.
- How are we going to design the next generation of fans for this market.
- To be hardworking and hardwearing fans have a poor reputation.

1912



1970



2018



Dyson



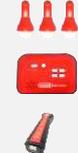
Design Challenge



# Who are Renewit?

- We are a leading manufacturer of solar off grid products.
- We own factory and do in house development, engineering, tooling and manufacturing.
- We have 8 plastic injection machines, PCBA machines and in house testing capabilities.
- We manufacture for international brands in off grid space as well as local companies in Africa.
- We have been in this industry for 12 years sold over 4 million products and developed over 80 sku's.

**renewit** SOLAR HOME POWER SYSTEM

2 Light Bulbs System	3 Light Bulbs System	3 Light Bulb System with Radio & Flashlight	TV System with Radio & Flashlight	Fridge System	KVA System
					
<b>5W Solar Panel</b> 3.7V 8800mAh Lithium Ion 2 x 100 Lumens LED Lights Mobile Phone Charging	<b>10W Solar Panel</b> 3.7V 8800mAh Lithium Ion 3 x 100 Lumens LED Lights Mobile Phone Charging	<b>10W Solar Panel</b> 3.7V 8800mAh Lithium Ion 3 x 100 Lumens LED Lights Mobile Phone Charging LED rechargeable Flashlight AM/FM rechargeable Radio	<b>30W Solar Panel</b> 14.8V, 6.6Ah Lithium Ion 3 x 100 Lumens LED Lights LED rechargeable Flashlight AM/FM rechargeable Radio 1 x 21" TV with S2 & T2 OR 1 x 32" TV with S2 & T2	<b>100W Solar Panel</b> 14.8V, 6.6Ah Lithium Ion 3 x 100 Lumens LED Lights LED rechargeable Flashlight AM/FM rechargeable Radio 26L DC Fridge OR 62L DC Fridge	<b>500W Solar Panel</b> 25.6V, 80Ah LFP Battery 3 x 100 Lumens LED Lights LED rechargeable Flashlight AM/FM rechargeable Radio 26L DC Fridge 16" DC fan 1 x 21" TV with S2 & T2 OR 1 x 32" TV with S2 & T2

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# Our Design Process

## Our Design Process

Our design process is focused on delivering results. Clients have the option of using our services from any part of this process.



### Strategy

- Competitive research
- Evaluation
- Design benchmarks
- Strategic mapping
- Design drivers
- Consumer targets
- Brainstorm sessions
- Design brief



### Ideation

- Concept generation
- Sketch exploration
- Initial CAD
- Design specs
- Style drivers
- Trend drivers
- Product language



### Design

- CAD work
- Reference drawings
- Engineering
- Prototyping
- Design specs
- Client reviews



### Engineering

- Mechanical design
- Design evaluation
- 2D reference drawings
- Prototyping
- Final product spec
- Factory quotations
- Project handover



### Suppliers

- Supplier liaison
- Production engineering
- Tooling drawing review
- Engineering sample
- Tooling release
- Tooling debug
- Production samples
- Production reviews

# Our customers

- To drive volume and the most impact we need to sell to a wide range of customers that will send to end consumers.
- These customers include:
  - Off grid solar companies (PAYG)
  - Distributors
  - Telecom companies
  - Farming co-operatives
  - International brands



# Our customers issues with current solutions

- Quality and performance against price. How can a consumer tell a good fan?
- Of a 50W home system the fan can be the cheaper of the main components compared to battery box or solar panel. If the fan fails the whole system gets returned or customers stops paying
- AC fans with DC power management
- Toy like in look – colour/plastic quality
- Looking for three solutions:
  - Standing fan
  - Desk fan
  - Wall fan
  - Ceiling fan



# Design for Manufacturing

- Manufacturing cost is a key driver:
- Keep to low cost materials. As nice as it is to have aluminium buttons it will drive up cost.
- Adaptable product. Can the same product be a stand fan, table fan and wall fan.
- Ceiling fan much overlooked in DC market but can be very low cost.  
..But must be able to be self installed and plug and play..Safety?



# Questions we will get asked?

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## ➤ Customer/Consumer questions

- How much does it cost?
- What is the warranty?
- Can it be easily fixed? Can we supply spare parts?
- Does it have its own battery? Can we put in other rooms away from main solar box?
- Can solar panel be connected directly to fan. Is there a standalone fan option?
- Can we run more than one fan from our solar kit?
- Does it work on PAYG?
- Can you have handshake connector so only works on PAYG? ..... Cost?

## ➤ Manufacturers questions:

- How many tools do we need to design?
- Material make up plastic / metal
- Is it easy to assemble?
- How many separate PCBA required?
- Will it pass drop testing / water ingress etc.
- Can it be flat pack? Can we reduce size of shipment box? Instruction manual for assembly.
- Can we leverage on some existing technologies I,e brushless motors

# Contact

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**Richard Atwal**

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