

Innovate Design Develop | Create value

# Designing for the developing world

Critical product design considerations for the  
developing world

MedTechWorld  
**MEDTEC**  
14-15 May 2014  
Olympia, London **UK**

Ryan Chessar

+44 1480 302700

14<sup>th</sup> May 2014

[www.42technology.com](http://www.42technology.com)

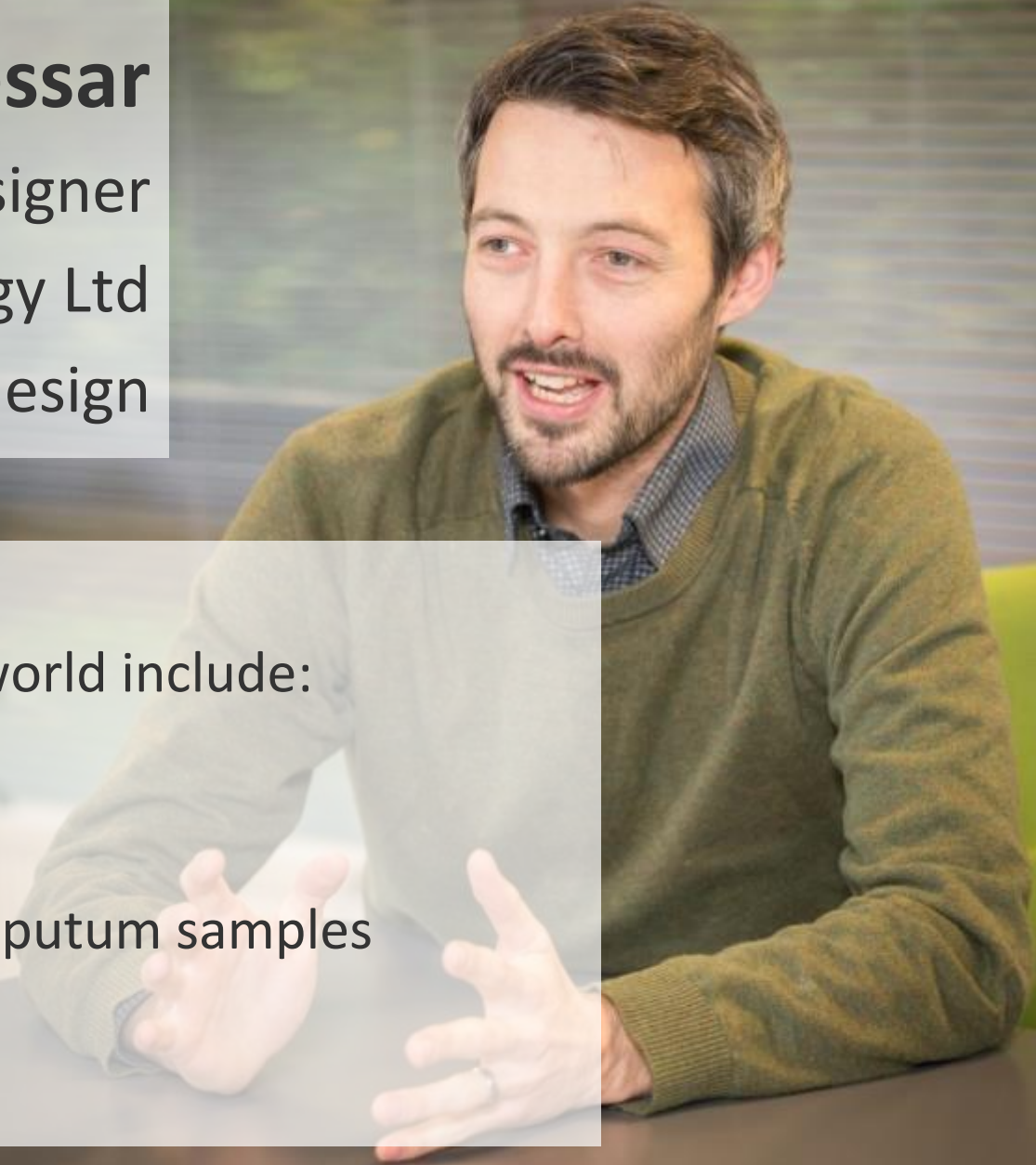


# Ryan Chessar

Senior Product Designer

42 Technology Ltd

Product and process design



Products for the developing world include:

- Diagnostic kit for TB
- Diagnostic kit for Malaria
- Hand tool for processing sputum samples



# The developing world needs appropriate healthcare

**Africa has  
25% of the world's disease burden  
3% of the health workers**

**Good solutions are not just cheap solutions**

**We have 10 key pointers to share today**



# 1 – Consider a new reimbursement model

Funding by non-profits typically need return based on health outcomes, not net margins

Potential for sales for profit in developed countries

Rental or shared ownership

## **2 - Understand the fundamentals**

**Sparse functionality of the key technology**

**Strip down the product functions and process resources**

**Be prepared to start again from scratch**



## 3 – Consider the full stakeholder chain

Patients

Carers

Health workers

Supply chain

Co-ordinators

Researchers

Funding bodies

Government

Photo credit: FIND

## 4 – Patients may be difficult to track

**No formal ID or address**  
**Common identical names**  
**Dates of birth unknown**  
**Desire for anonymity**  
**Transitory movements**



## 4 – Patients may be difficult to track

### Potential solutions

Portable rapid diagnostic kit

GPS logging



## 5 – Design for error, not success

**Users may have limited training, support and facilities**

**Minimise opportunity for error and misunderstanding**

*Photo: US Navy / Mass Communication Specialist  
2nd Class Jesse B. Awalt*

## 5 – Design for error, not success

### Potential solutions

Reduce steps and parts

Poka-yoke

Non-lingual communication

Clear positive and negative user feedback

*Photo: US Navy / Mass Communication Specialist  
2nd Class Jesse B. Awalt*



## 6 – There is no Royal Mail

**Months of customs delays are possible**

**Potential issues with corruption,  
transportation discontinuity and loss**

## 6 – There is no Royal Mail

**Potential solutions**

**Use a local agent**

**Manufacture locally**

**Use established component supply route**



## 6 – There is no Royal Mail

**Case study: DfM ([Designthatmatters.org](http://Designthatmatters.org))**

**An incubator made from readily available car parts**

**Takes advantage of an already established supply and repair network**

*Photo: Designthatmatters.org*

## 6 – There is no Royal Mail

**Case study: Colalife**  
(colalife.org)

**First version fits in Coca-Cola crates**  
**Second version uses Coca-Cola's 'demand driven distribution' model**

Photos: Simon Berry, Colalife



## 7 – Make the most of your resources

**Limited or unreliable access to:**

**Electricity**

**Clean water**

**Enclosed, clean, facilities**

**Refrigeration, air conditioning, heating**



## 7 – Make the most of your resources

### **Case study: Mobile Lab** (Pasteur Institute, Cambodia)

**On board electricity generator, refrigerated storage and lab facilities**

*Photo: Pasteur Institute*



## 7 – Make the most of your resources

### Case study: Peekvision

Mobile app and smartphone clip-on hardware

Check glasses prescription

Diagnose cataracts

Examine the back of the eye for disease

Share images with non-local specialist

## 7 – Make the most of your resources

### **Case study: Recycled Incubator Technique (RIT)**

by Dr Hippolite Amadi, Imperial College London

**Refurbishing incubators with long lasting and serviceable technology**

**Delivers 10 functional incubators for the cost of one new one**



## 8 – Protect against the environment

**Extreme temperatures**

**Humidity**

**Dust**

**Extreme weather**

**Can be a problem indoors too!**

## 9 – Your solution must stand up on its own

Limited access to support, training, accessories, and spare parts

96% of medical devices fail within 5 years \*

39% never work \*

*Photo: Evgeni Dinev, FreeDigitalPhotos.net*

*\* R. A. Malkin, "Design of health care technologies for the developing world" 2007*



## **9 – Your solution must stand up on its own**

**Robust, simple equipment, no servicing**  
**Simply replaceable parts for critical functions**  
**Protective transportation/storage casework**  
**Protective packaging in-use**  
**(e.g. self-closing dust-proof doors)**

## 10 – Test early and test often

**You cannot fully understand all the variables at first**

**Involve key stakeholders in the creative process**

**Make your initial solution testable and get it out there**



## 10 – Test early and test often

**Case study: Sputum collection device for FIND**  
(Foundation for Innovative New Diagnostics)

**‘Used-like’ demonstration model**  
**Flexible development prototype**  
**Separate ‘works-like’ prototype**  
**‘Works-like, used-like’ prototype**

## 10 – Test early and test often

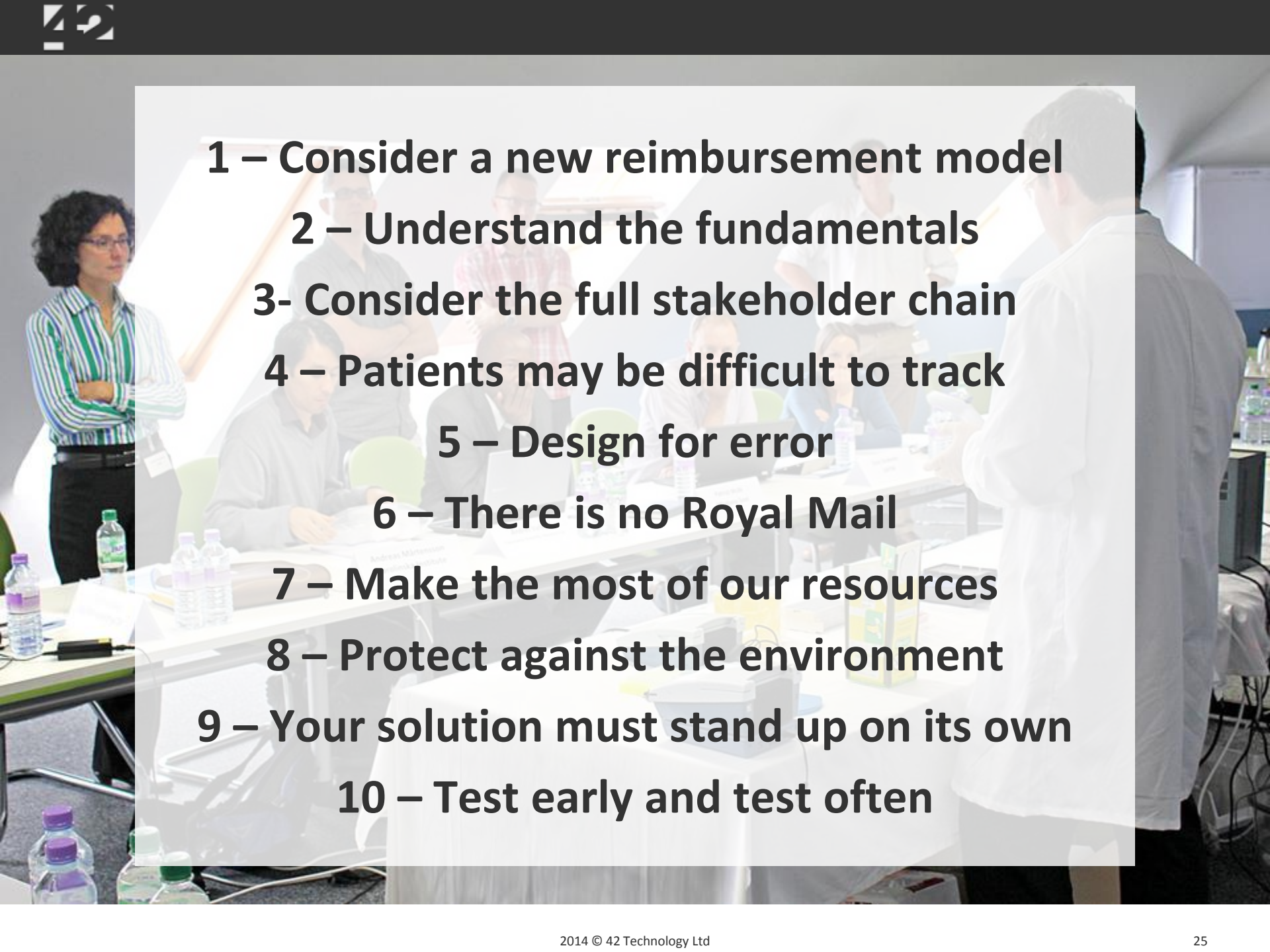
**Potential approaches**

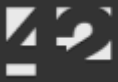
**Visits to the target geography**

**Collective stakeholder focus groups**

**Trials with representative users and patients**



- 
- A woman in a striped shirt is standing on the left, presenting to a group of people seated around a long table in a meeting room. The room is filled with people, some looking at laptops, others at the presenter. There are water bottles on the table. The background is slightly blurred, showing a modern office environment.
- 1 – Consider a new reimbursement model**
  - 2 – Understand the fundamentals**
  - 3- Consider the full stakeholder chain**
  - 4 – Patients may be difficult to track**
  - 5 – Design for error**
  - 6 – There is no Royal Mail**
  - 7 – Make the most of our resources**
  - 8 – Protect against the environment**
  - 9 – Your solution must stand up on its own**
  - 10 – Test early and test often**



**Ryan Chessar**  
42 Technology Ltd

Thank you for your time

