EDGE-COPD
a collaboration of
engineers, patients, doctors, nurses

Carmelo Velardo

@2dvisio

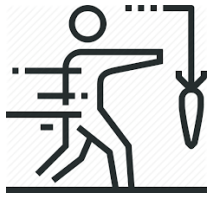
UCL - TechSharing Seminar Series

22nd May 2017

UNIVERSITY OF OXFORD

Institute of Biomedical Engineering

Department of Engineering Science – University of Oxford



Motivations

- COPD is the fourth most common cause of death globally and predicted to be the third by 2030
- COPD care costed:
  - UK £800M (half is hospital-based care)
  - EU over 38.6B Euros
  - US $49.9B
  - global costs are estimated at $141 billion.
- Technology has yet to prove its benefit to patients with chronic conditions

Adeloye, D. et al., 2015. Global and regional estimates of COPD prevalence: Systematic review and meta-analysis. Journal of global health

EDGE-COPD team

Mobile Health group:

Prof Gari Clifford

Dr Oliver Gibson

Dr Syed Ahmar Shah

Prof Lionel Tarassenko

Dr Andreas Triantafyllidis

Dr Carmelo Velardo

Clinical collaborators:

Prof Andrew Farmer

Dr Maxine Hardinge

Prof Carl Heneghan

Ms Linda Heritage

Dr Jonathan Price

Ms Heather Rutter

Dr Veronika Williams

Department of Health

wellcome trust

Design for the ageing population

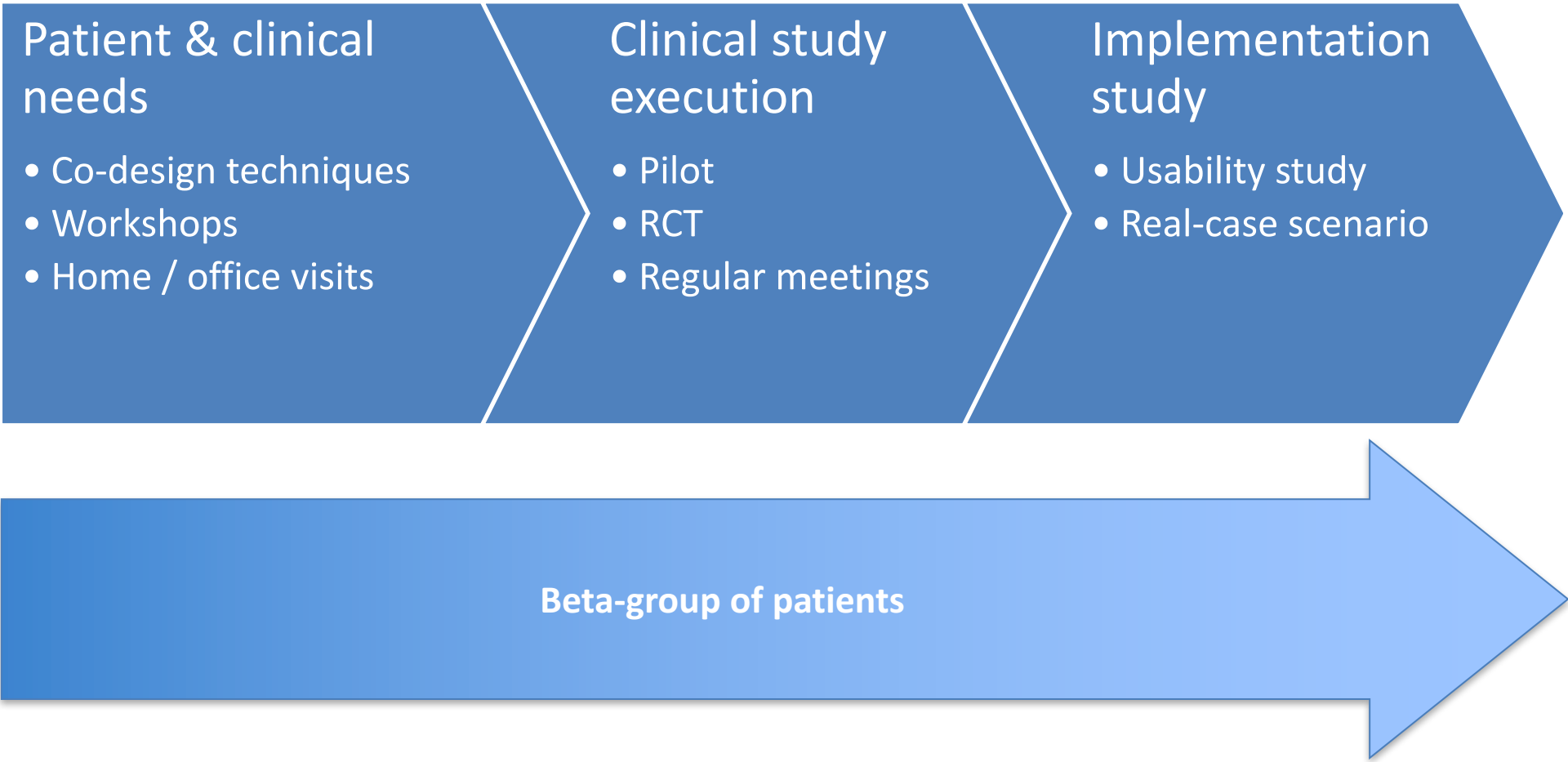
A dedicated “telehealth box” is a reminder of illness

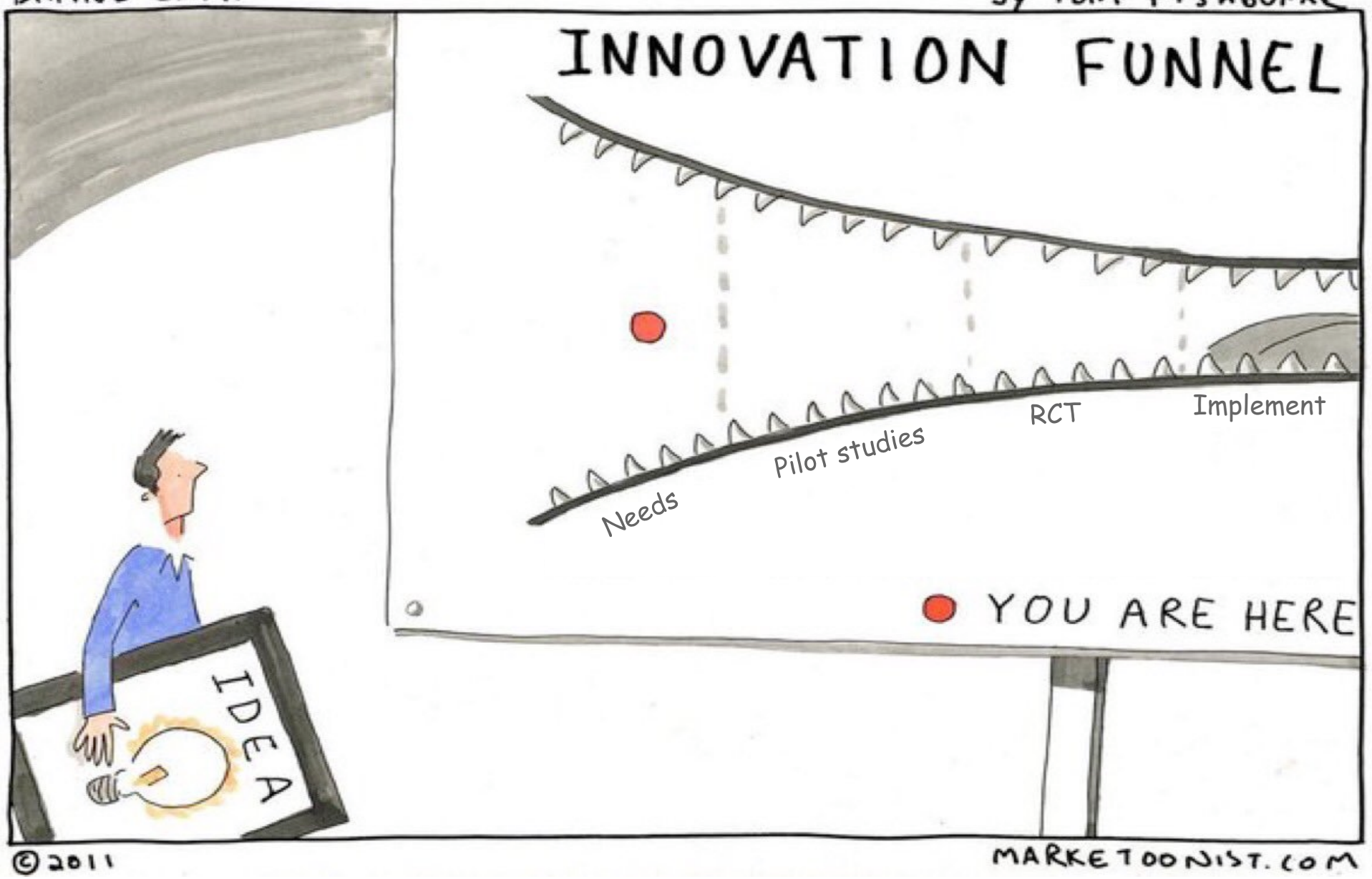
Self-monitoring data (recorded by non-experts) is often unreliable

A successful digital health strategy needs a *self-management* component, tailored to that individual.

Remote monitoring on its own is not sufficient.
Patients must be given help to interpret their data.

Project development

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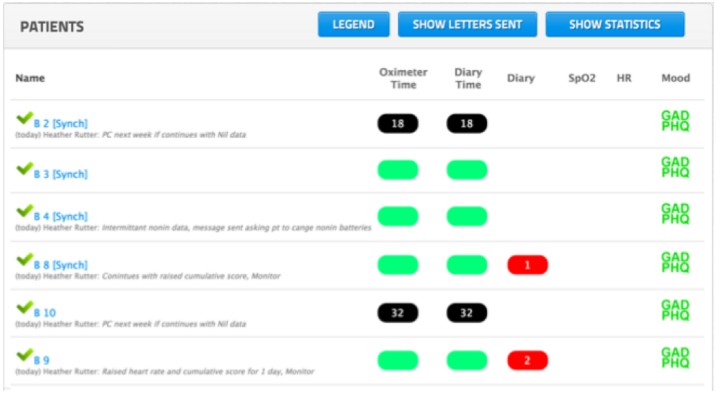
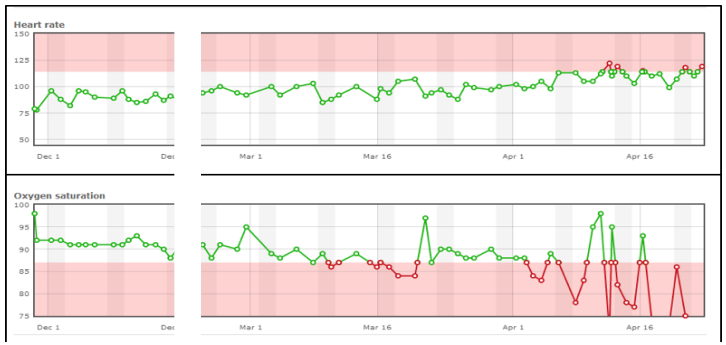
EDGE
for better care

- Home based patient monitoring for COPD
- Unassisted patients self-manage their condition
- While we predict deterioration using their daily data recordings

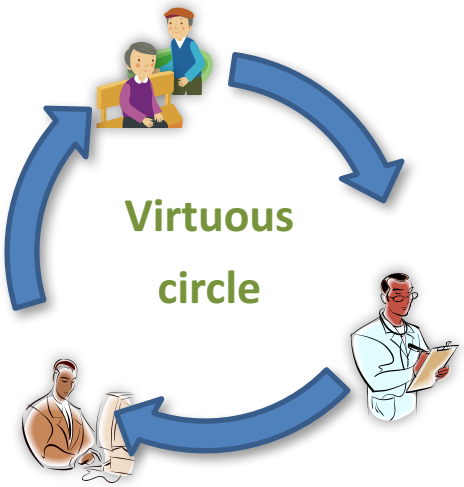
Designed for / with …



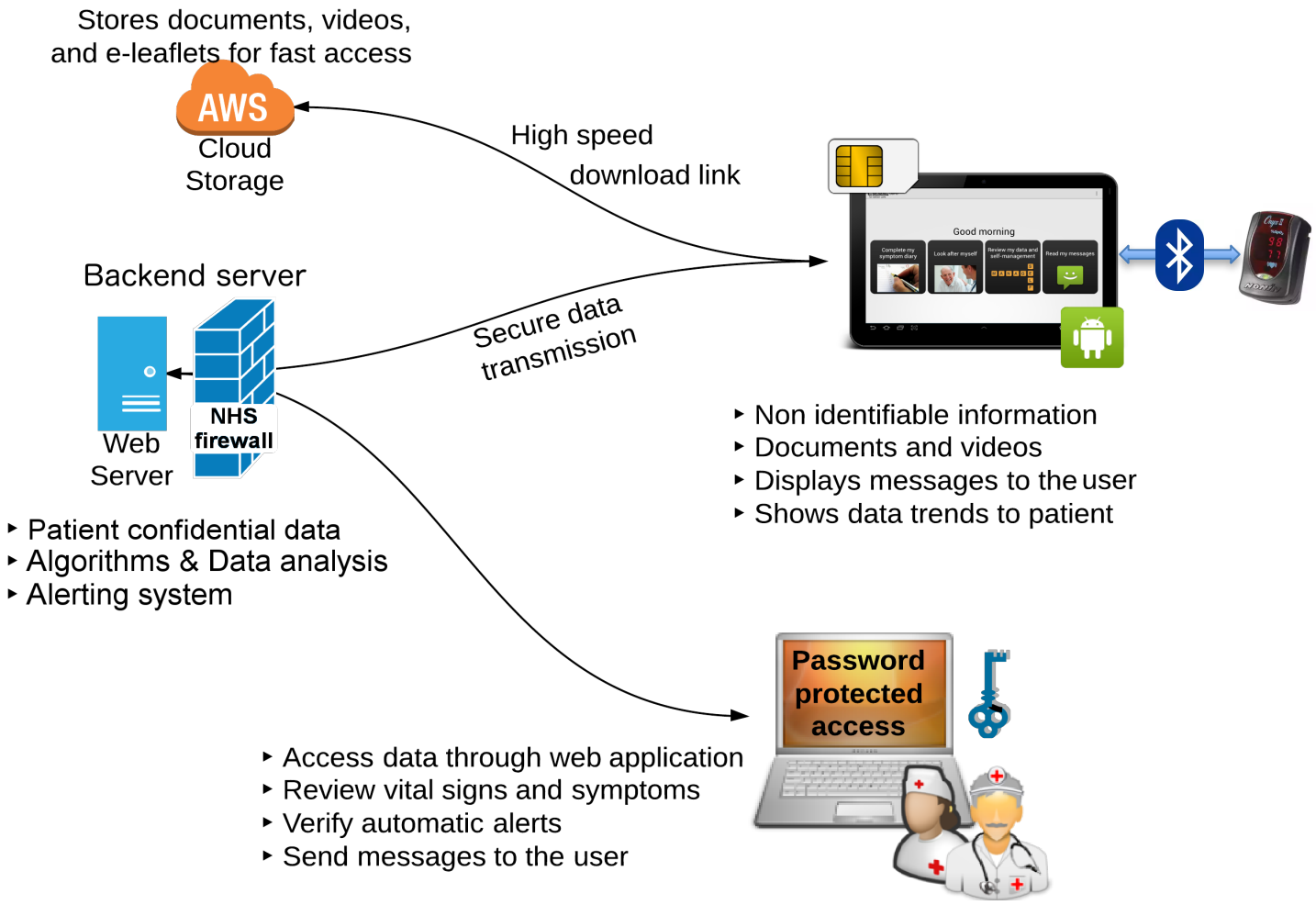
Doctors



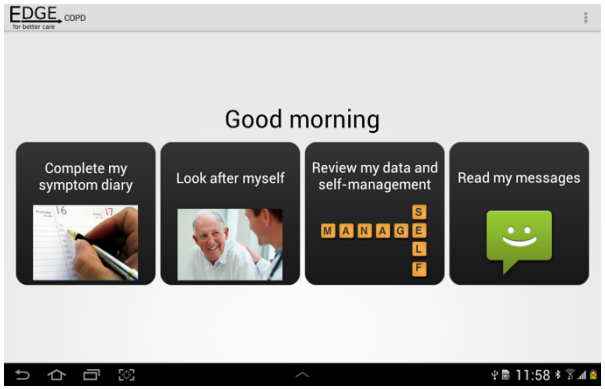
Engineers

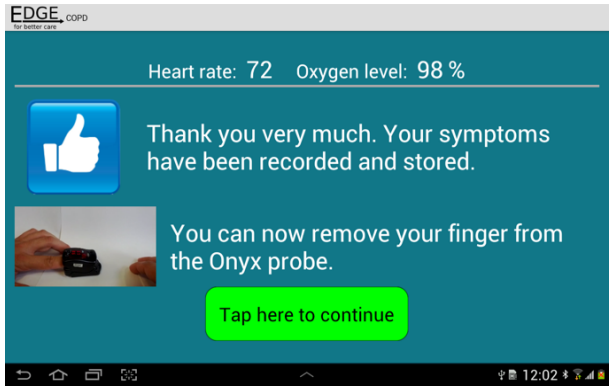


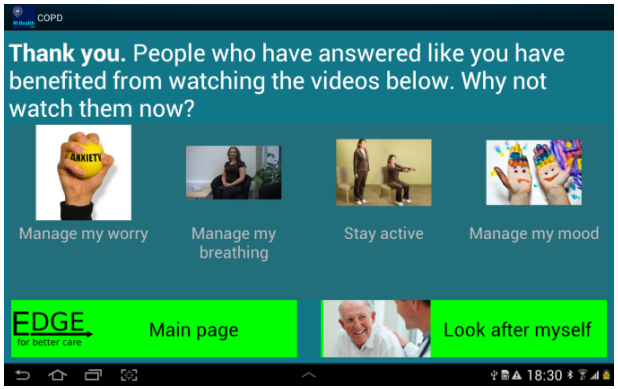
Patients



Velardo, C. et al., 2017. *Digital health system for personalised COPD long-term management. BMC Medical Informatics and Decision Making*







- Wireless-enabled tablets with large icons (no keyboard)
- Smart Bluetooth sensors for *reliable* physiological data
- Patients given help to interpret their data
- Tailored *self-management* component
- Machine learning for personalised alerting

EDGE
for better care

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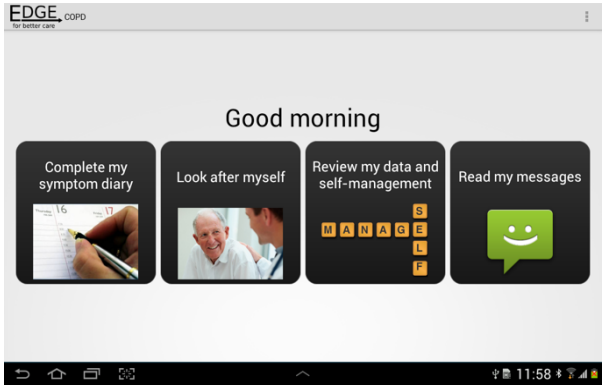
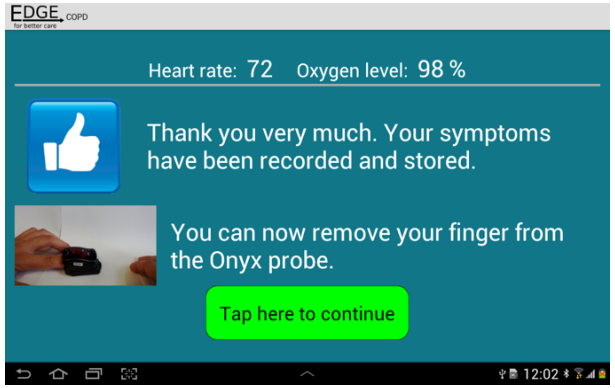
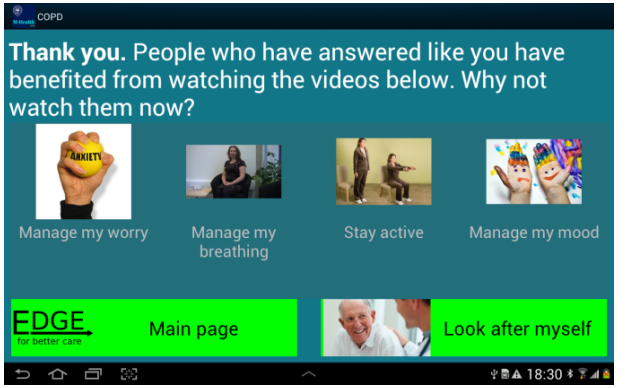






- 165-patient RCT
- Overwhelming acceptance of technology (ease of use, perceived relevance and usefulness of feedback)
- Average usage: 6 times a week

- Fewer contacts with GPs (4 vs 5.5, p = 0.06) and Practice Nurses (1.5 vs 2.5, p = 0.03)
- 20% reduction in numbers of hospital admissions

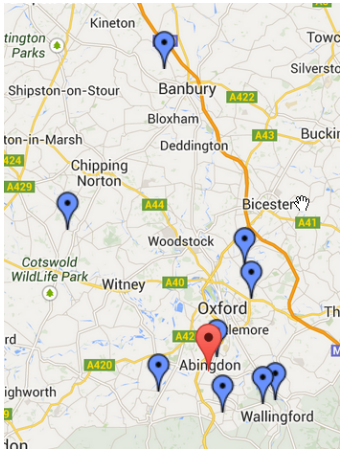
Williams, V. et al., 2014. Using a mobile health application to support self-management in COPD: a qualitative study. *British Journal of General Practice*

Farmer, A. et al., 2017. Self-Management Support Using a Digital Health System Compared With Usual Care for Chronic Obstructive Pulmonary Disease: Randomized Controlled Trial. *Journal of medical Internet research*

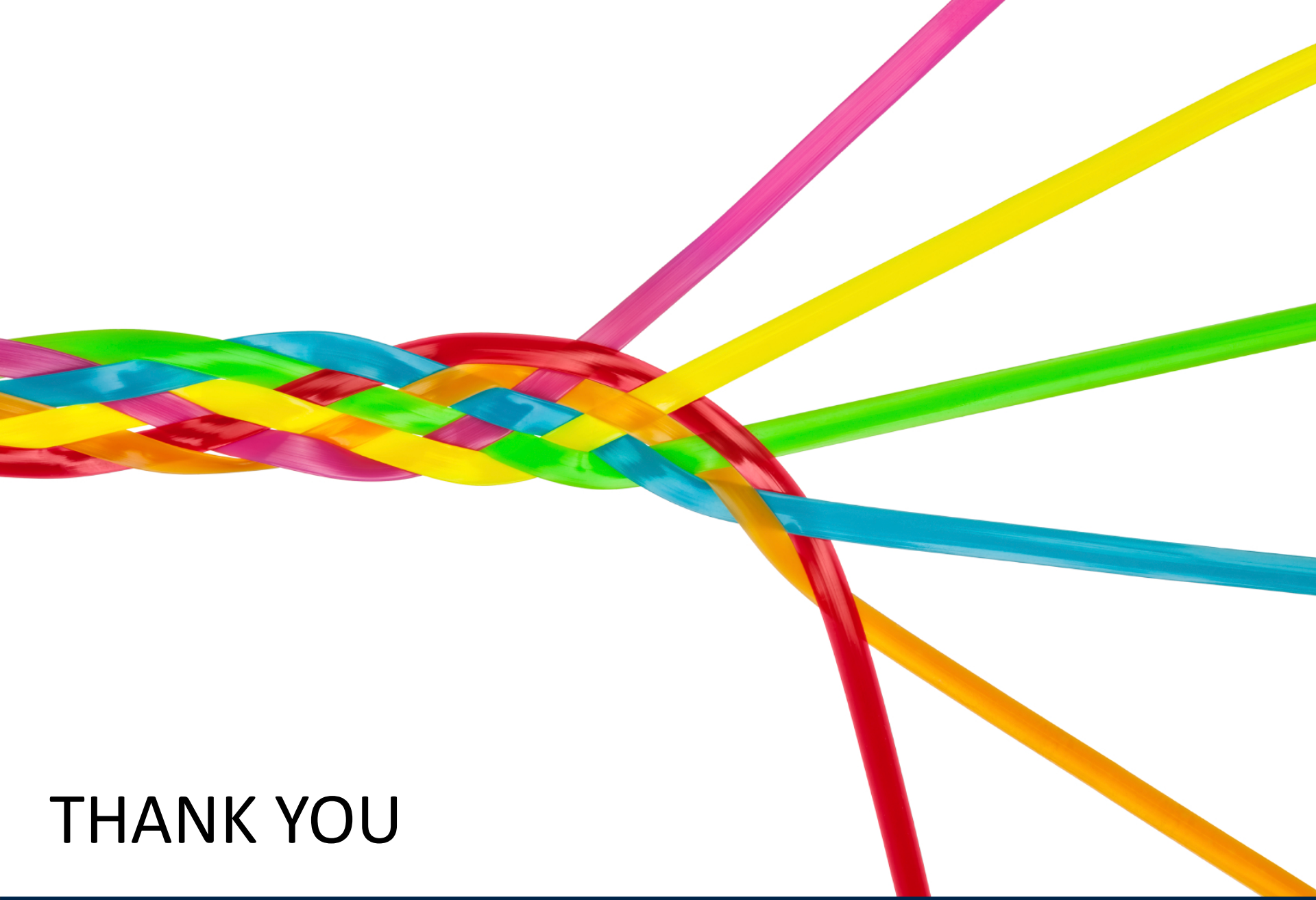
Challenges from the engineer perspective

- Requirements are always changing / being updated
- Understanding the needs of patients
- Understanding the need of clinicians
- Communicate and express challenges / ideas / solutions

WHAT WORKED vs. IMPROVEMENTS



- ✔ Patient involvement
  - Beta patient
  - Home visits (nurse + engineer)
- ✔ Strong multidisciplinary collaboration
  - Weekly / Monthly / Bi-yearly meetings
- ✔ Approach to new ideas
  - Design → Discuss with Beta patients → Apply → Feedback → Repeat
- 🤔 We focussed on patients and had to re-focus on professionals
  - Usability study (not by design) organised at the end of the RCT



THANK YOU