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**TIC | Salut Social**  
Technology, innovation  
and digital transformation.

# Imagine 2029: Our data, our health, our care – 20th anniversary of EHTEL

## EHTEL 2019 Symposium

14:45 – 15:45 [S10]



Aula 1  
First Floor

### Imagining 2029. The future is here - peek into AI based innovation

*Towards 2029. What will AI mean for the people: From a vision– incl. a use case – to interactive polls.*

Session Chair:

Martin Denz, Telemedicine & Enhanced Medicine, Medbase Group, Switzerland

#### The Future of AI Based Innovation

George Crooks, Director, Digital Health Institute, Glasgow, Scotland, United Kingdom

#### The Future of Smart Self-management for People/Patients with Chronic Diseases

Grant Reilly, Digital Health Institute, Glasgow, Scotland, United Kingdom

#### Interactive Panel with the Audience

Martin Denz, Medbase Group, Switzerland

Symposium  
Gold  
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**DM+**  
Coach

**T...Systems**  
Let's power higher performance



#EHTEL\_Symposium



#EHTEL\_BCN



@ehtel\_eHealth



The Future is Here

Prof George Crooks

CEO The Digital Health & Care Institute

Scotland's national innovation centre for digital health and



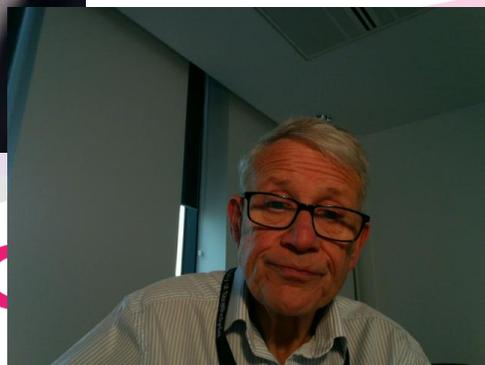




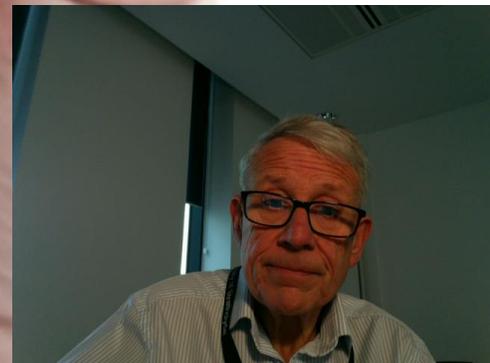








GET  
THE  
FACTS



OLD  
PATIENTS



DIGITAL  
HEALTH & CARE  
INSTITUTE



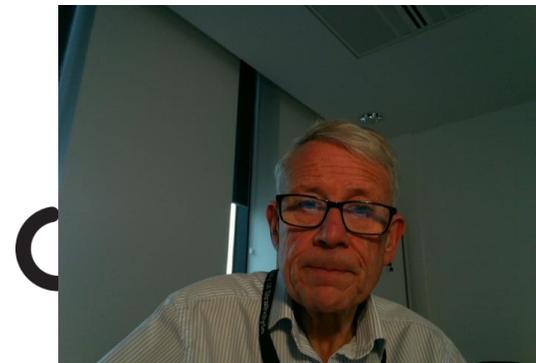
German Hospital  
C. D. D. W. L. A. I.





# Workforce Challenges?





# Integrating Innovation

DEMONSTRATING



Service model innovation



Technical/Digital innovation

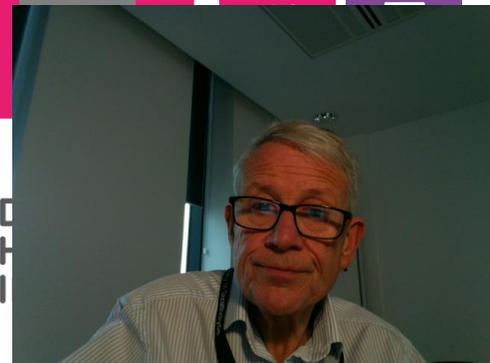


Business model innovation

INTEROPERABLE

Selected service models

WILLINGNESS TO ADOPT/ SCALE



# Communities and technologies are getting smarter



Our vision is that innovation in digital health and care will help Scotland's people to live longer, healthier lives, create sustainable services and help Scotland's economy grow.

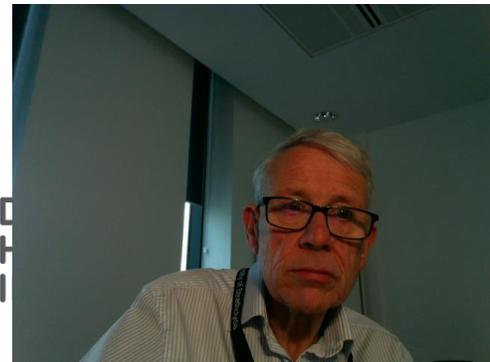


# DHI priority themes:

- Healthy ageing
- Capacity and capability building
- Non communicable conditions
- Citizen empowerment
- Digital skills and workforce development

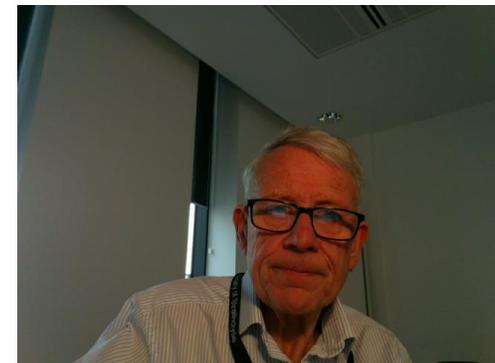
# DHI offers capability and capacity in:

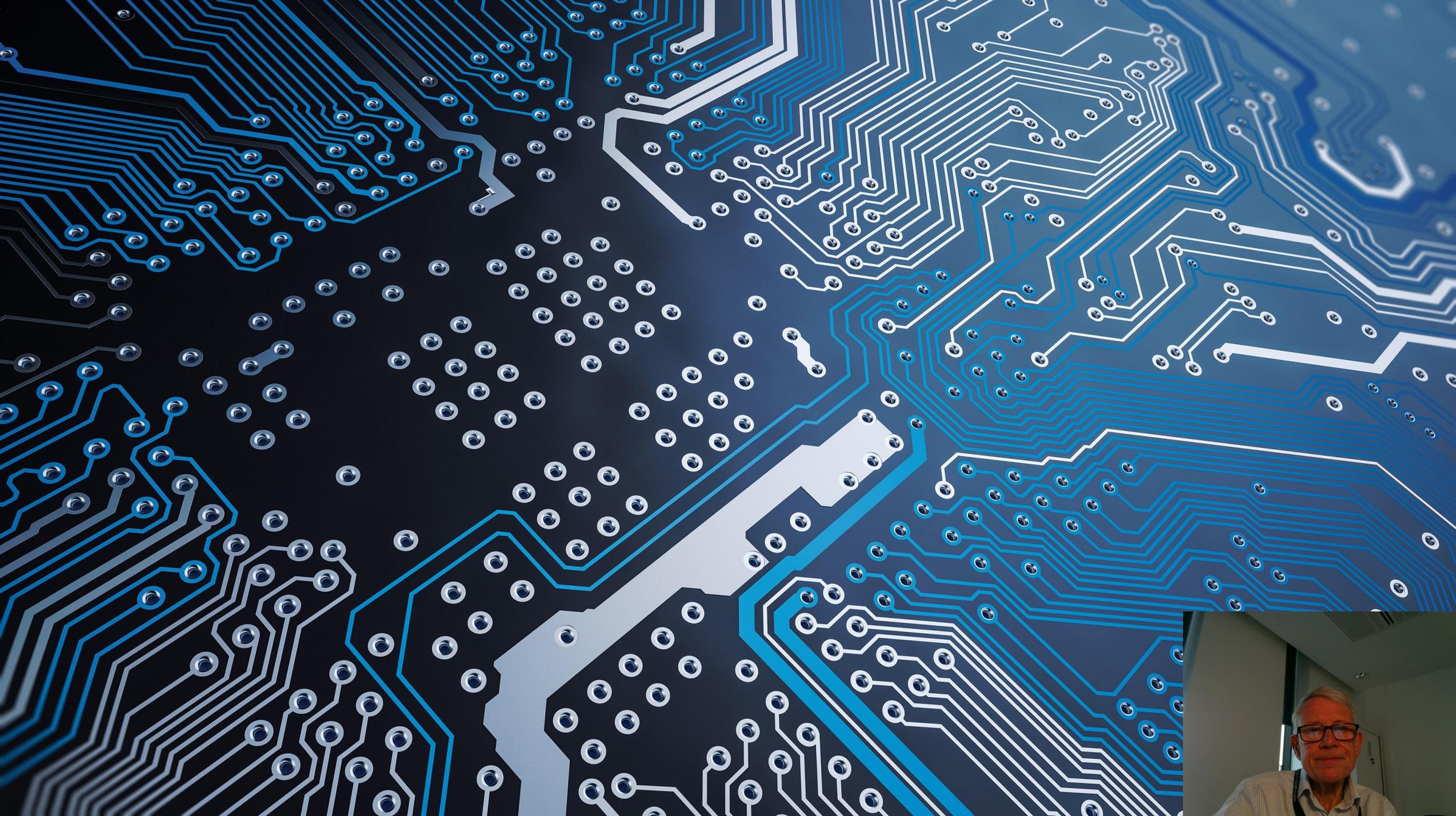
1. Research and knowledge
2. Service Design
3. Technical
4. Business
5. Project management
6. Leadership and facilitation





SO WHAT IS OUR FUTURE?



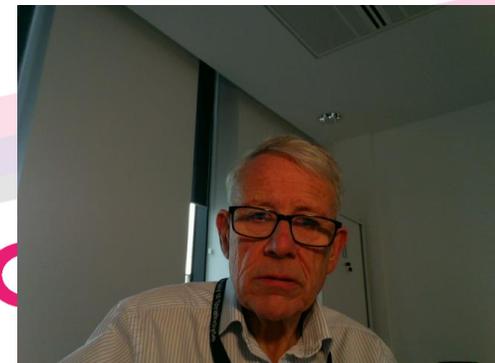
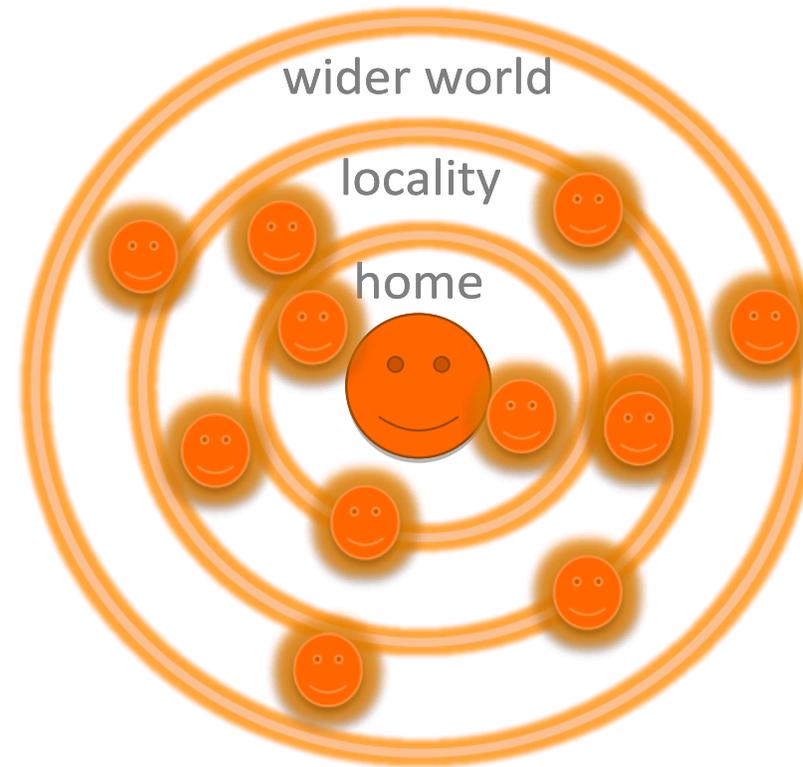




# Health, care and wellbeing – person focussed

## Increasing;

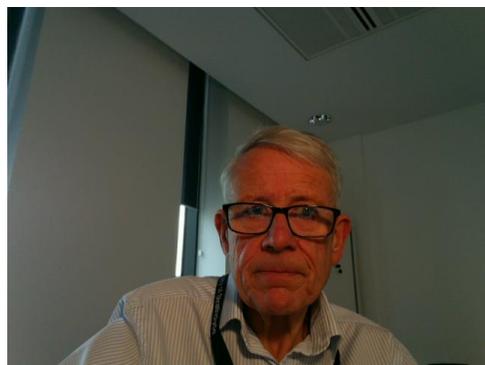
- Choice
- Control
- Connectedness
- Collaborations
- Contributions
- Communities

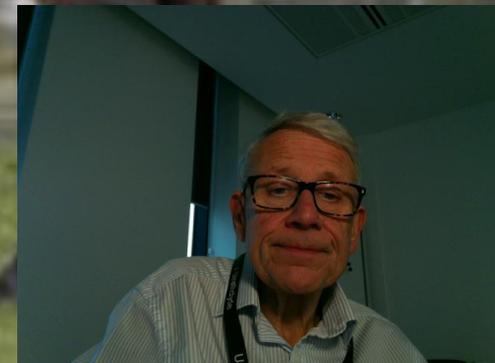






**DIGITAL  
HEALTH & CARE  
INSTITUTE**



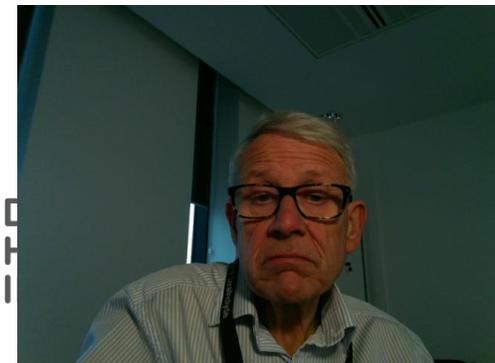
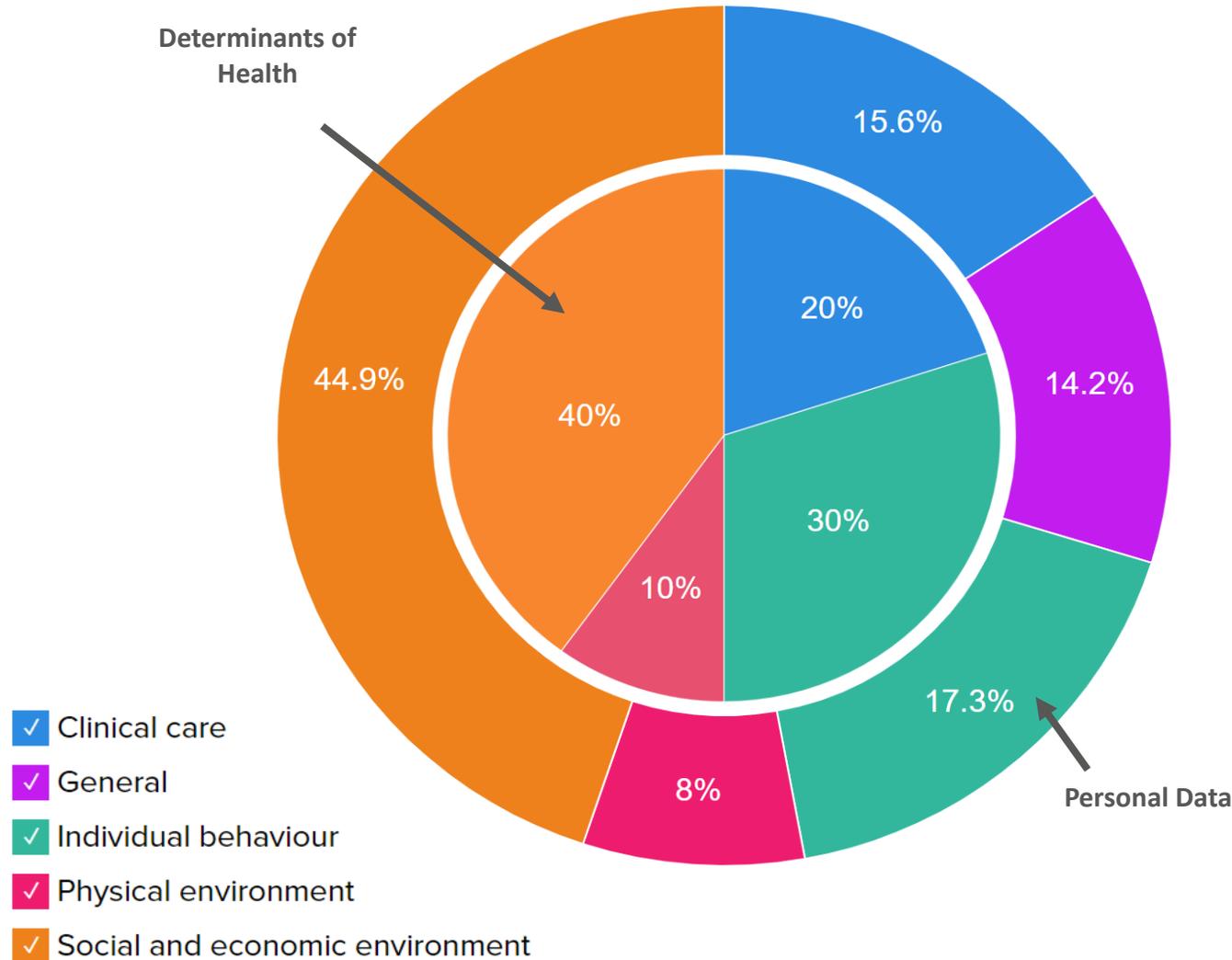




# Next Generation Services



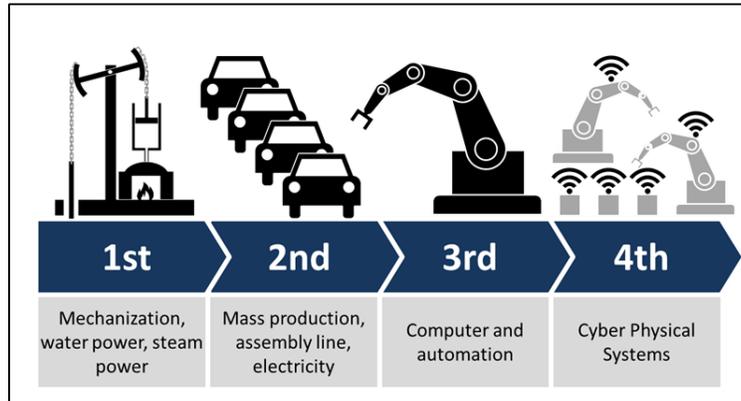
# Personal Data by Determinants of Health



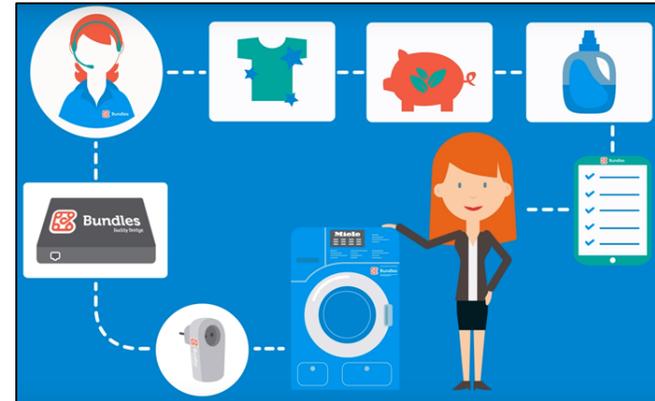
# Market trends

## Product Management

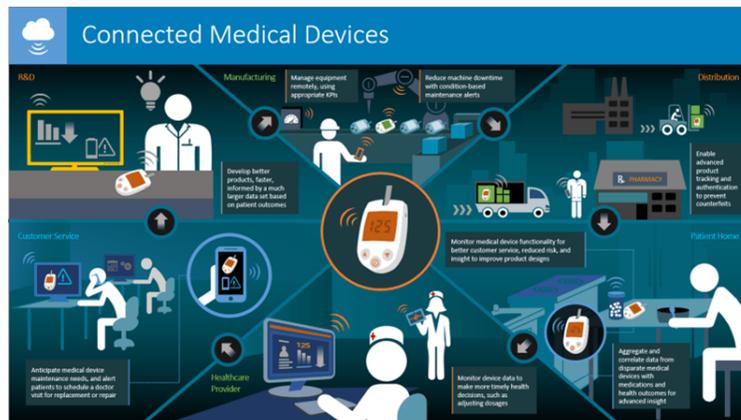
All Markets



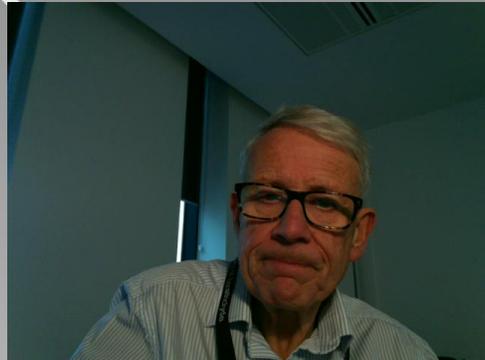
## Integrated Service Models



Health & Care



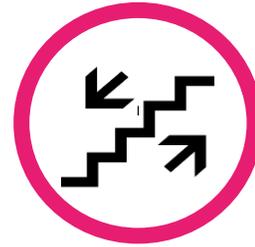
# Citizen-centred data sharing



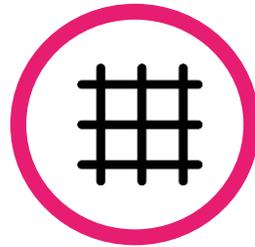




# Service design principles



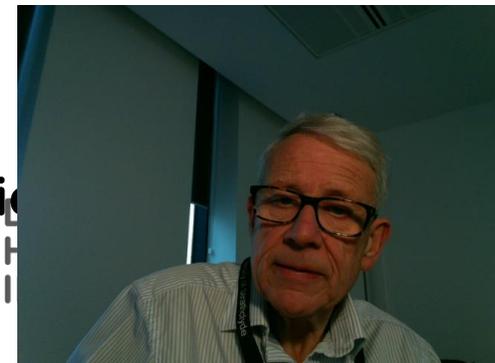
Predictive and proportionate care



Balance between user and system needs



Citizen activated services





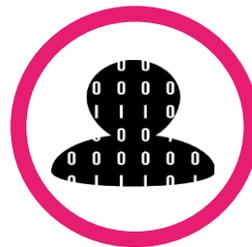
# Technical principles



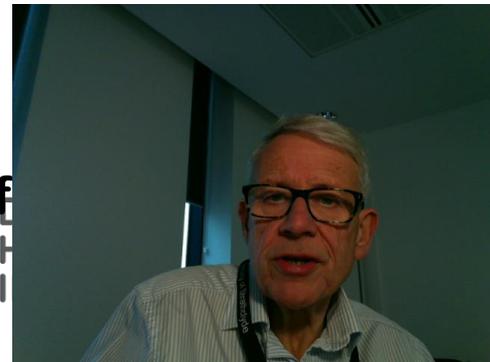
Create data only once



Trust in distributed data

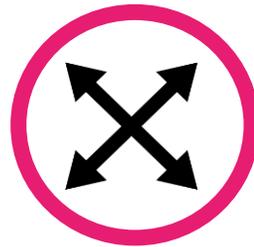


Personal ownership of data





# Business principles



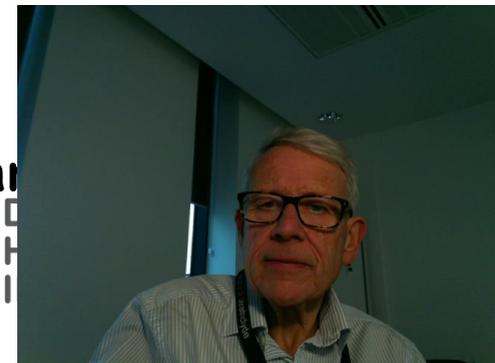
Open solutions that scale and evolve



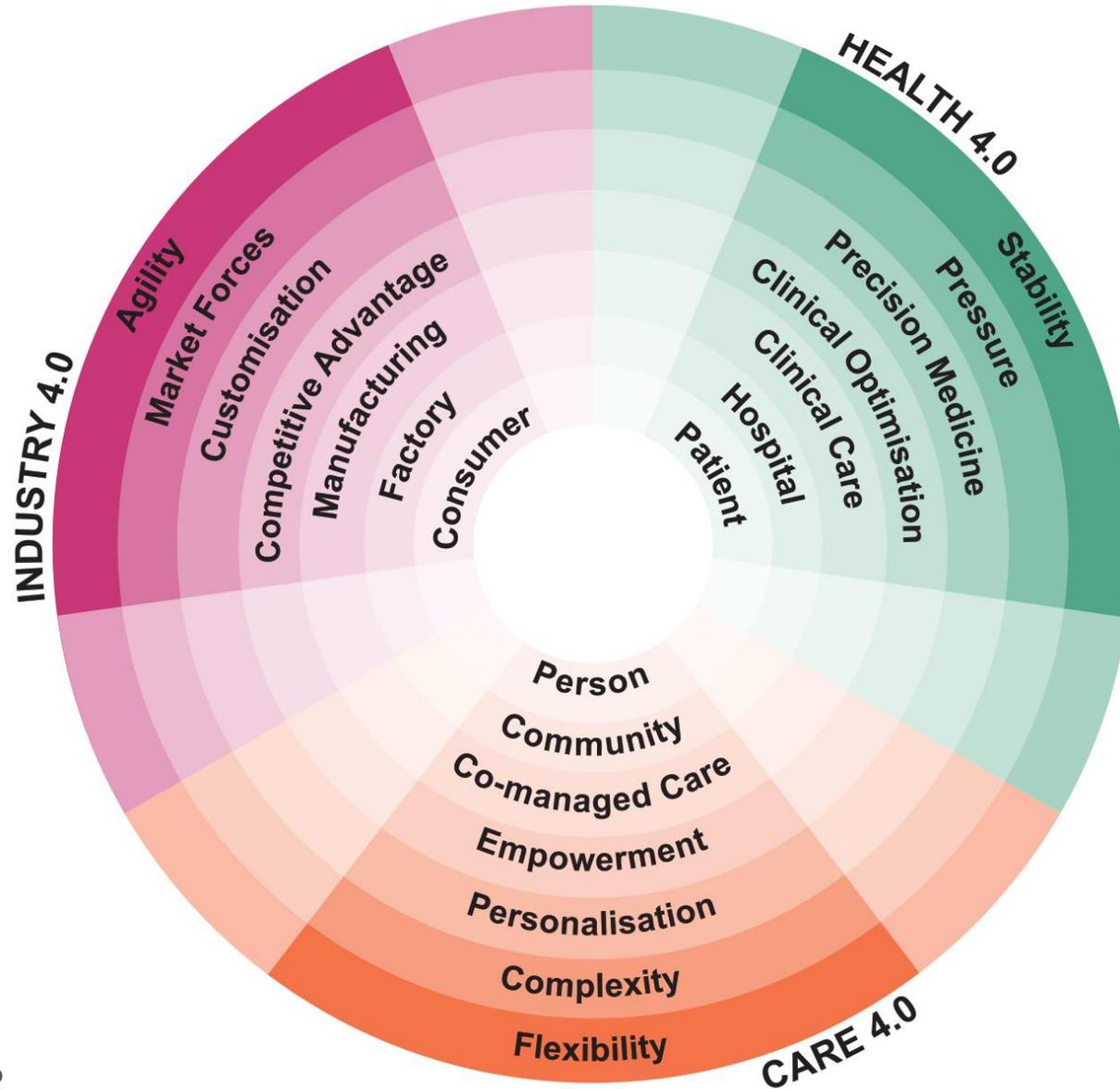
Services not products



Serve the consumer and the commissioner

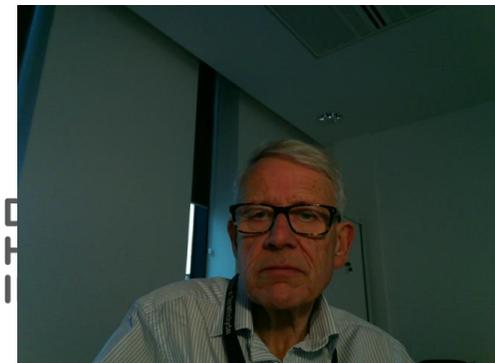


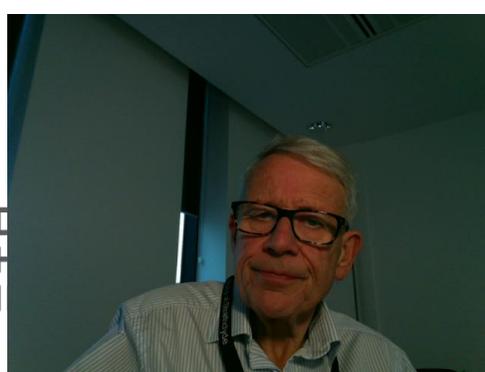
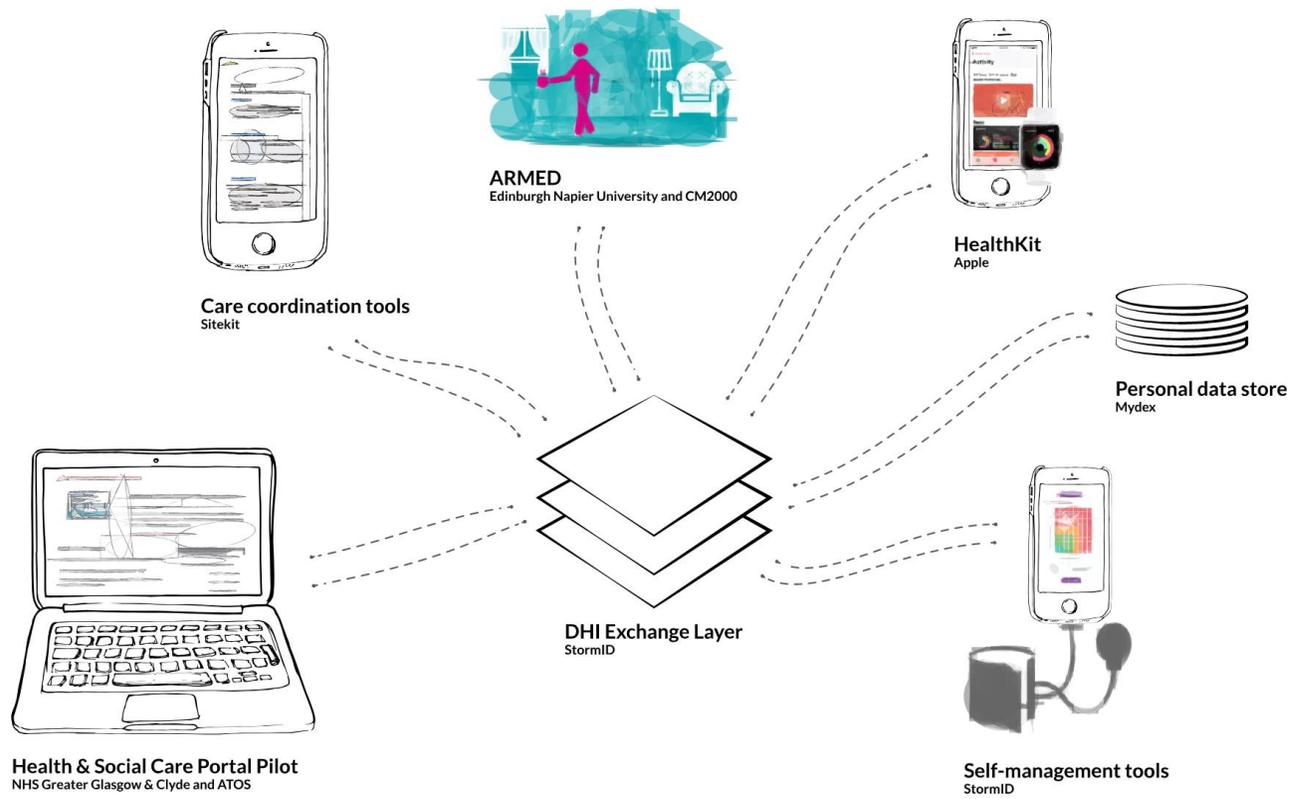
# Care 4.0



Chute & French, 2018

Visual Credit: Angela Tulloch







## The Digital Diabetic

Integrating patient medical data with consumer data to enable better self-management of my health and care

### Grant Reilly

- Head of Marketing & Communications, Digital Health & Care Institute
- Founder, Ganesha Gear, Diabetic Bag Of Life



# My story

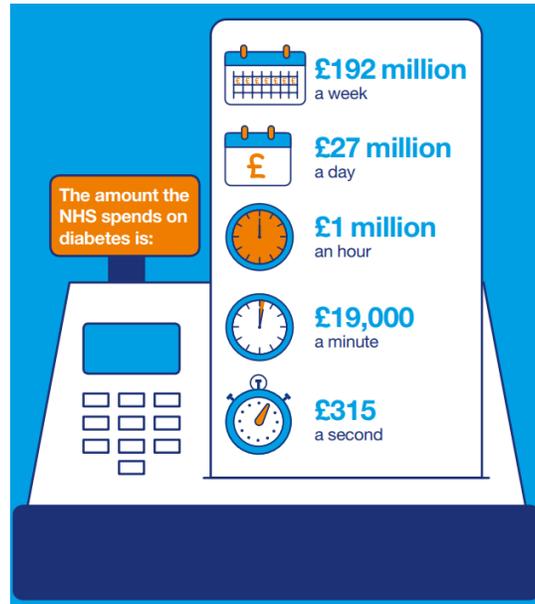
- Level 27 - Type 1 diabetic
- Daily routine
  - approx. 15 blood glucose tests
  - minimum of 6 insulin injections
- Positive circle of care
  - family/ friends
  - completed DAFNE course
  - 2 diabetic clinics per year
  - 1 diabetic eye screening per year
  - part of an online Diabetic Muscle & Fitness community
- Focus on physical activity to manage my diabetes





The NHS spends at least **£10 billion a year** on diabetes.

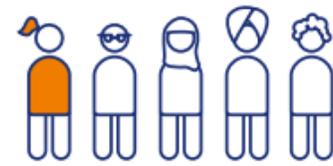
That's 10% of its entire budget.



About **90%** of people with diabetes have **Type 2**.

About **8%** of people with diabetes have **Type 1**.

About **2%** of people have **rarer types** of diabetes.



**Fewer than one in five** people with **Type 1** diabetes are meeting the recommended treatment targets that will reduce their risk of complications.

**4.7 million** people in the UK have diabetes.



**One in 15** people have diabetes in the UK.

People with diabetes spend around **three hours** with a healthcare professional every year.

The number of people diagnosed with diabetes in

England is more than **3,222,500**



Scotland is more than **295,700**



Wales is more than **194,600**



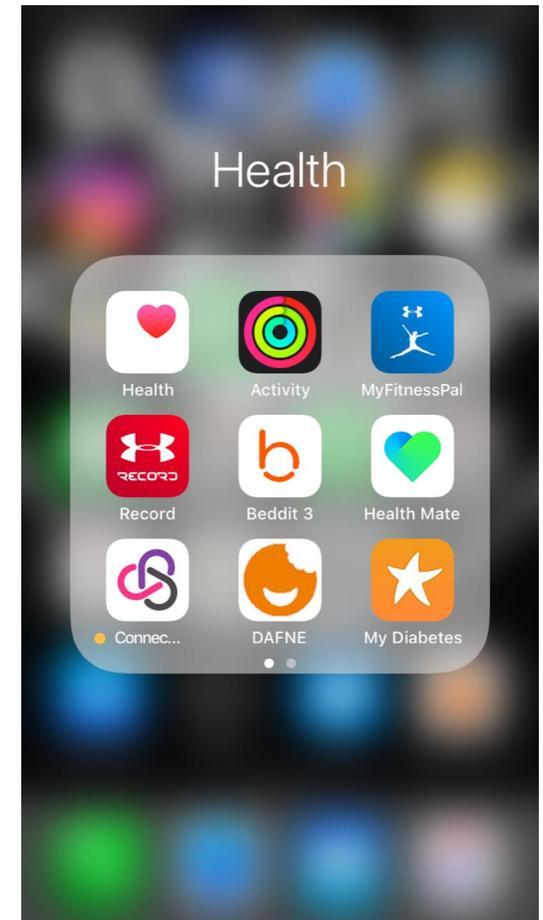
Northern Ireland is more than **96,100**



For the remaining **8,757 hours** they must manage their diabetes **themselves**.

# My story

- Want **confidence** to develop my own care plan
- **Empower** myself and potentially my health care professionals
- **Enable** more informed decisions
- Use existing **digital technologies** to provide data to do this

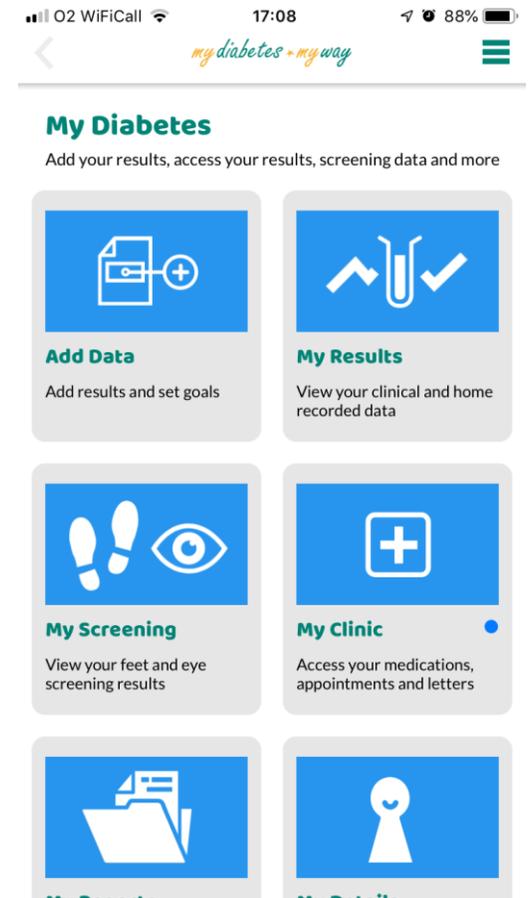


# My (limited) data story

- Clinic results (via [mydiabetesmyway](https://mydiabetesmyway.com))

	HbA1c	Blood pressure	Cholesterol	Weight
<b>Non diabetic</b>	<b>&lt; 42 mmol/ mol</b>	<b>≤ 120/ 80 mmHg</b>	<b>3.37 mmol/ l</b>	<b>183 lbs*</b>
<b>Oct 2018</b>	<b>49 mmol/ mol*</b>	<b>149/ 102 mmHg</b>	<b>5.0 mmol /l</b>	<b>225 lbs</b>
<b>Apr 2018</b>	54 mmol/ mol	139/ 79 mmHg	4.9 mmol/ l	215 lbs
<b>Aug 2017</b>	55 mmol/ mol	140/ 64 mmHg	5.2 mmol /l	211 lbs

\*Ideal HBA1C for a diabetic is **48 mmol/ mol**



# Objectives

# SMART Objectives

1. ↓ Decrease weight by **25 lbs** by **Monday 01 July 2019**
2. ↓ Decrease or maintain HbA1c (**49 mmol/ mol**) by **Monday 01 July 2019**
3. ↓ Decrease blood pressure from **149/102 mmHg** by **Monday 01 July 2019**
4. ↓ Decrease cholesterol from **5.0 mmol/l** by **Monday 01 July 2019**

Technology

# Technology (implantable)

- Freestyle libre blood glucose monitor and app
  - minimises my need to do actual finger prick blood tests
  - provides 24 hour analysis
  - logs carbohydrates and helps calculate optimal insulin dose to maintain my pre-defined targets



# Technology (wearables)

- Apple iWatch Series 4, iHealth and activity apps
  - monitors activity levels
  - calories burned
  - heart rate
  - exercise
  - stand time throughout the day, relaxed breathing



# Technology (peripherals)

- Nokia Body+ Smart Scales, wireless blood pressure monitor and Health Mate app
  - monitor my blood pressure
  - average heart rate
  - daily steps
  - weight
  - body fat
  - muscle mass
  - body water/ hydration
  - bone mass



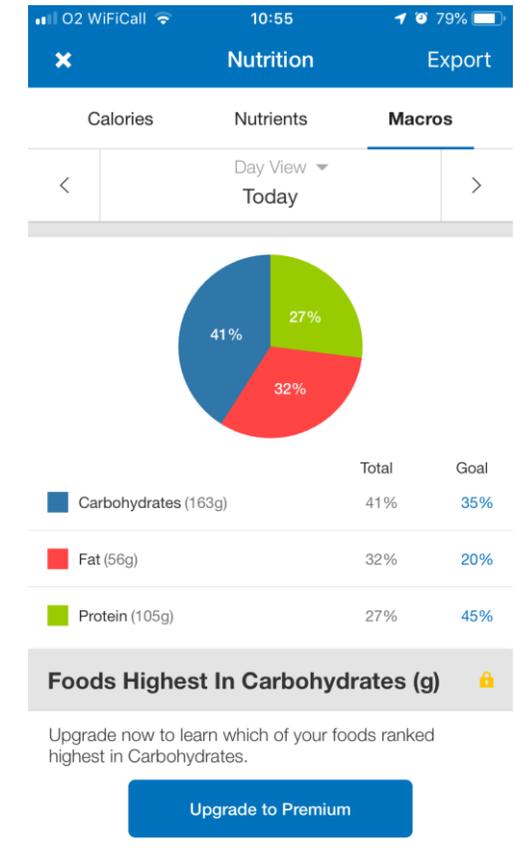
# Technology (peripherals)

- Beddit sleep monitor and Beddit 3 app
  - amount of sleep
  - type of sleep
  - sleep efficiency
  - time awake
  - temperature
  - sleeping heart rate



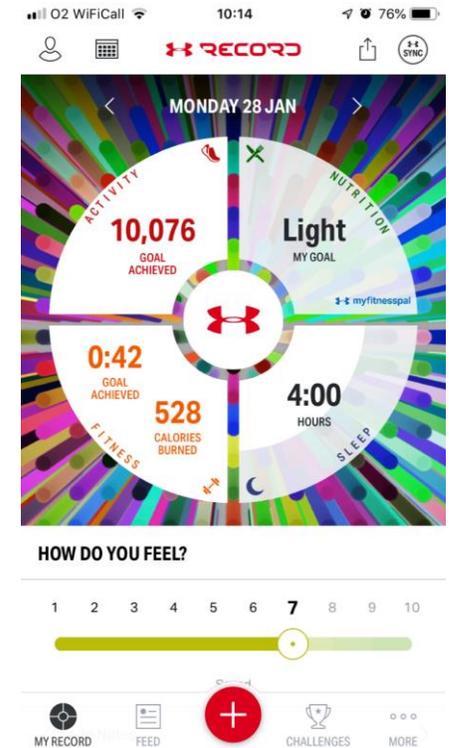
# Technology (applications)

- MyFitnessPal app
  - monitors my nutrition
  - calorie consumption
  - macros split
  - water consumption



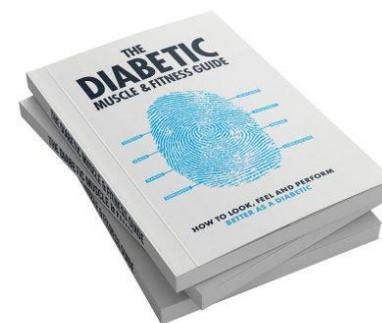
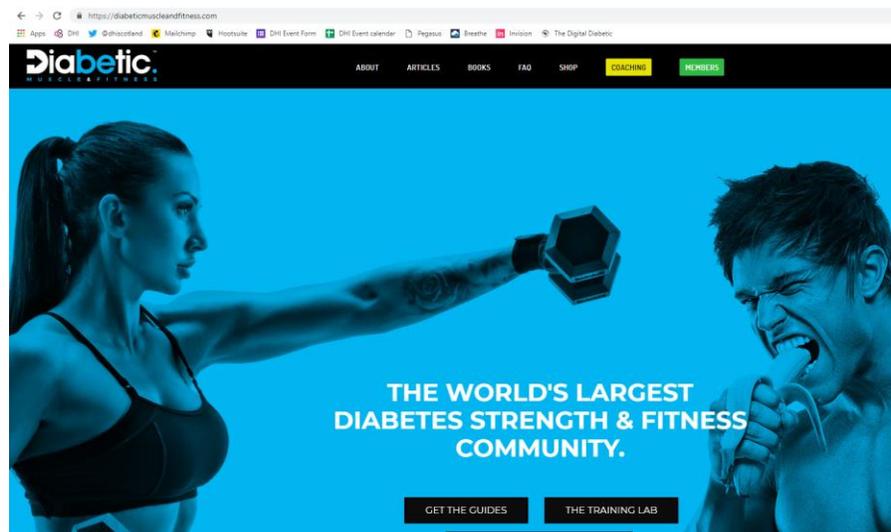
# Technology (applications)

- Under Armour Record
  - tracks my steps
  - monitors nutrition
  - exercise
  - sleep
  - **provides support**
    - asks how I feel
    - provides motivational messaging



# Technology (online/ digital)

- Diabetic Muscle & Fitness online community
  - provides my training programmes
  - expert advice
  - **Peer support network** of diabetics facing similar challenges and opportunities



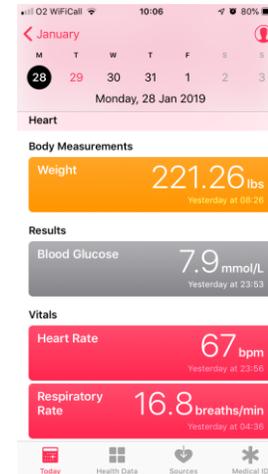
Data

# Data

## Challenges

- Lots of technology and devices
- Different interfaces
- Lots of data
- Duplication of data
- Lots of options for viewing
- Minimal integration between devices

# Apple health suite



# Freestyle libre

MON 28 JAN 2019

Time	CP	BG	QA	BI
23:53 BED	0	7.9	0	0
23:02 BI	0	8.5	0	12
19:33 DINNR	4.5	10.3	9+3	0
17:35 DRIV	0	10.8	0	0
16:45 OTHER	0	10.8	0+3	0
15:28 OTHER	0	10.3	0	0
14:12 AFEX	0	11.7	0	0
12:54 LUNCH	5	6.6	10	0

SUN 27 JAN 2019

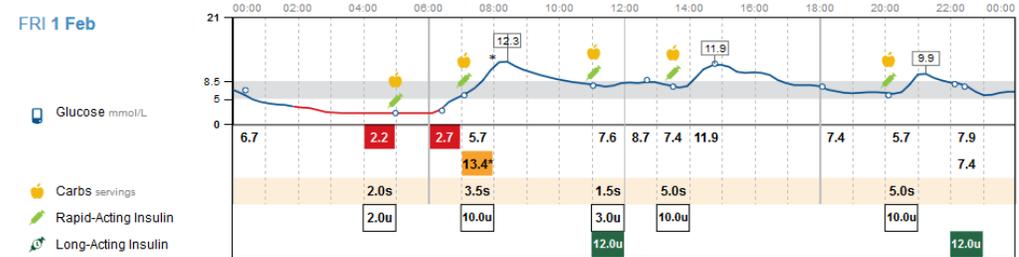
Time	CP	BG	QA	BI
12:10 OTHER	0	6.2	0	0
11:09 OTHER	0	6.1	0	0
10:29 BI	0	7.1	0	12
07:48 DRIV	0	8.8	0	0
06:55 BFAST	3.5	14.2	12	0
06:11 WAKIN	0	12.2	3+3	0
00:51 BED	0	10.9	0+2	0

## Daily Log

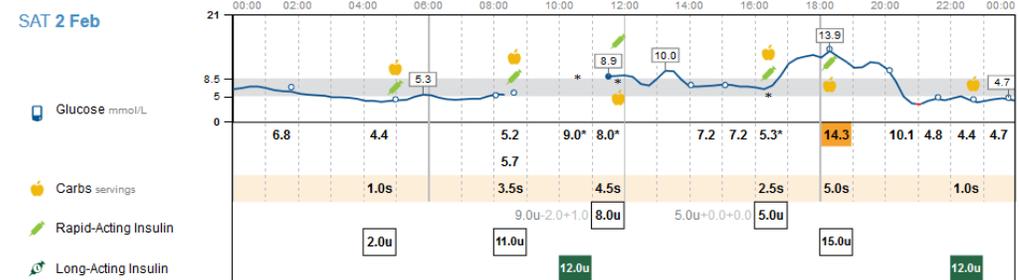
1 February 2019 - 14 February 2019 (14 Days)

## LibreView

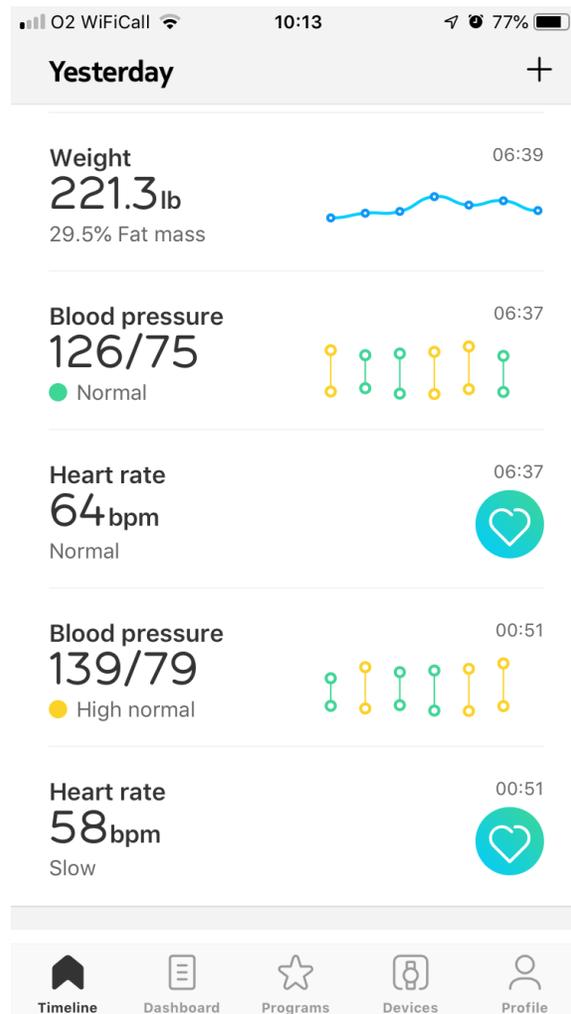
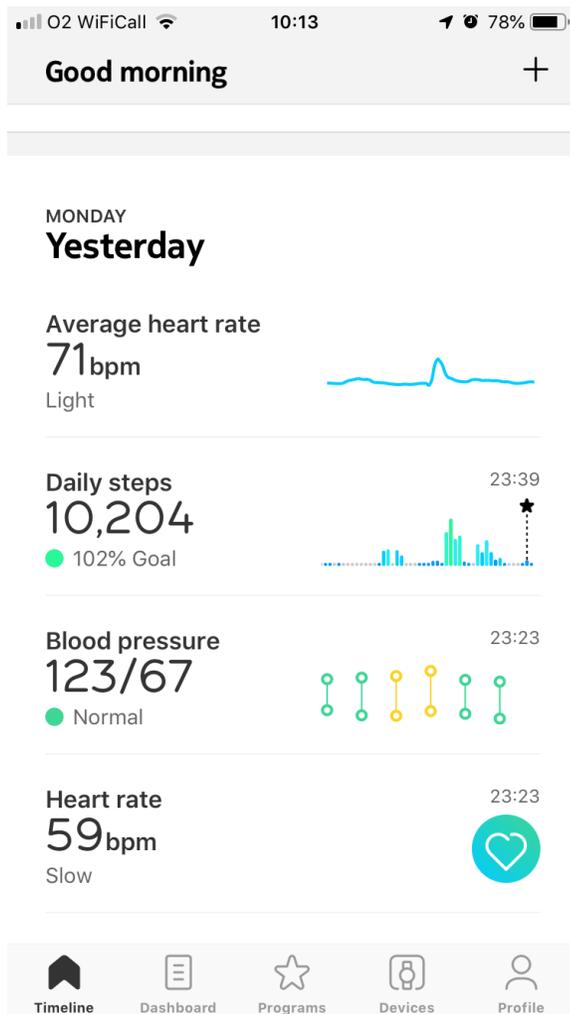
### FRI 1 Feb



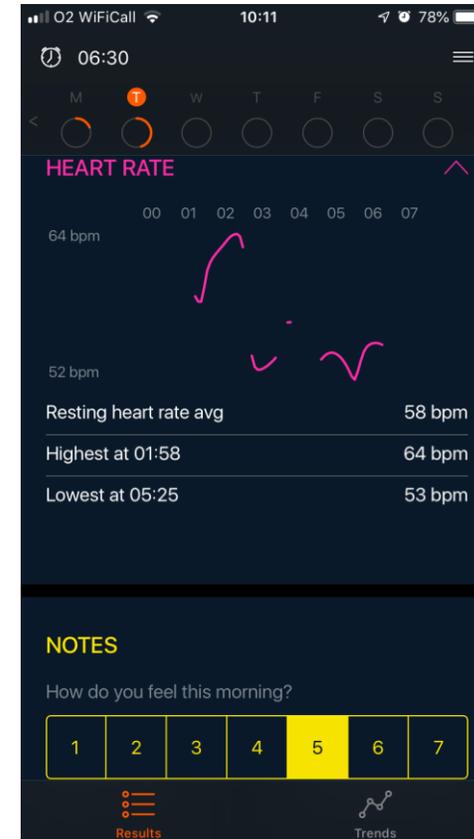
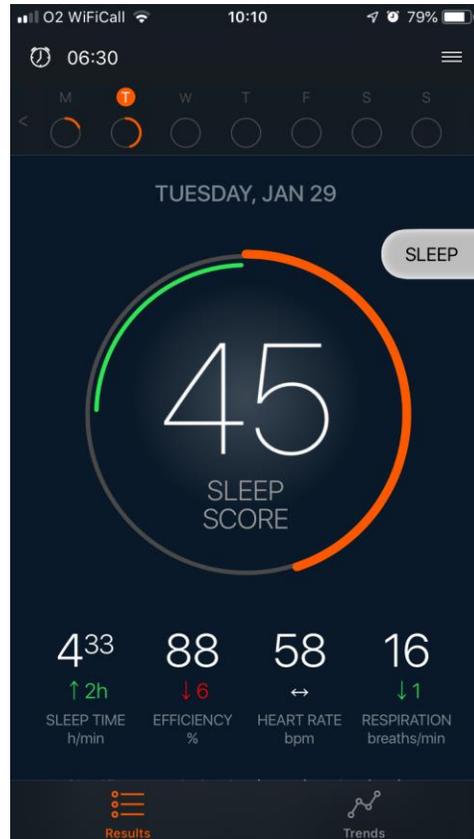
### SAT 2 Feb



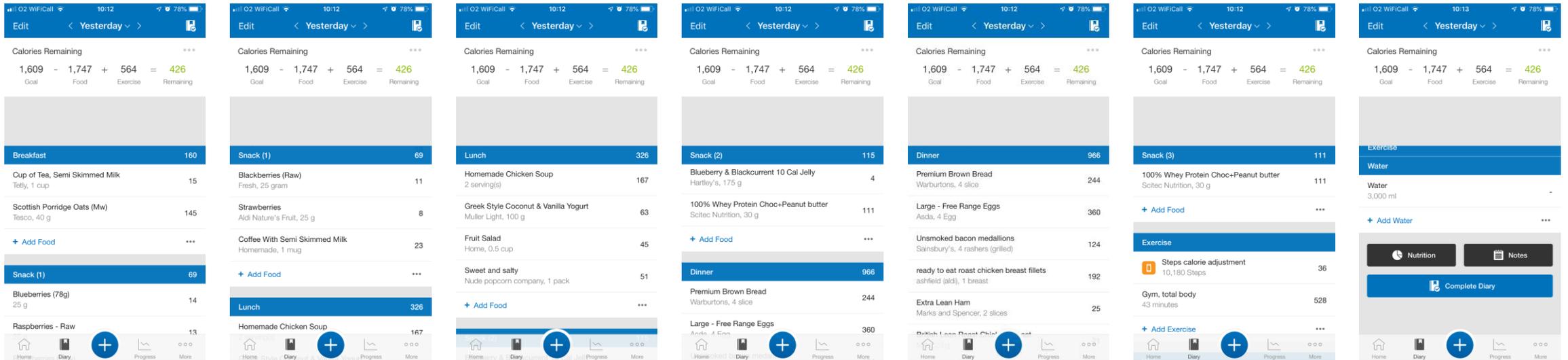
# Nokia/ Withings



# Beddit sleep monitor and app



# MyFitnessPal



Progress

# Progress to date

1. ↓ Decrease my weight by **25 lbs** by **Monday 01 July 2019**
  - **Currently lost 6.7 lbs** (225 lbs – 218.3 lbs)
2. ↓ Decrease or maintain my HbA1c (**49 mmol/ mol**) by **Monday 01 July 2019**
  - **HbA1c 43 mmol/ mol**
3. ↓ Decrease my blood pressure from **149/102 mmHg** by **Monday 01 July 2019**
  - **Current average 131 mmHg /79 mmHg**
4. ↓ Decrease my cholesterol from **5.0mmol/ l** by **Monday 01 July 2019**
  - **Currently 4.9mmol/l**
5. My nutrition has improved
6. My body measurements have changed (2 inches off my waist)
7. Identified patterns between data (sleep, physical activity, blood glucose levels)

# Personal feedback

1. Currently **time consuming** to capture and review data
2. Ownership and **accountability** for my data
3. **Gamification** of data – activates my competitive side to increase streaks of “good” data
4. Makes me **think more** about “simple” decisions I make
5. Gives me **confidence** in making informed decisions on altering insulin doses

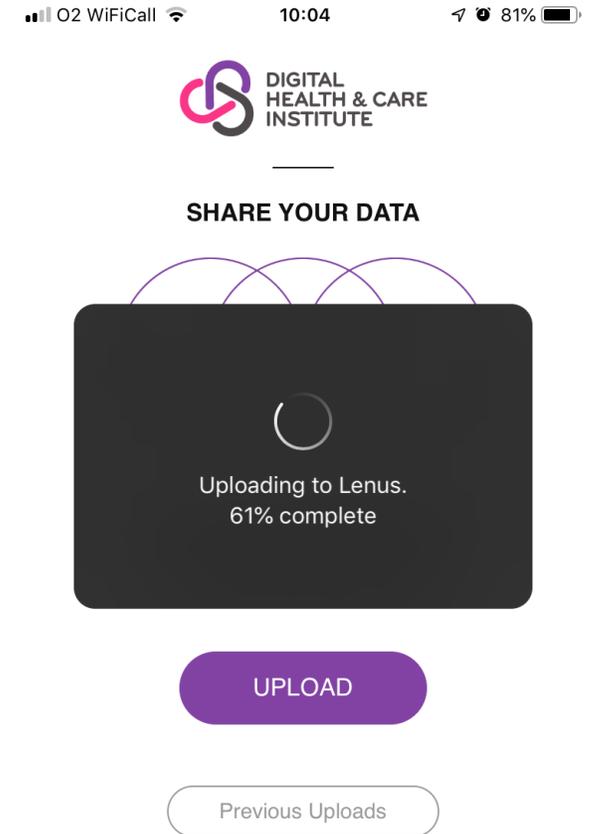
# Final thoughts

- Obviously this is “**super user**” level of data capture  
but
- Simpler versions of this could be developed using a few key device's that would have maximum benefit
  - **iWatch**
  - **MyFitnessPal**
  - **Sleep monitor**

The art of the possible...

# DHI Exchange layer

- DHI are developing a data exchange capability
- Patients can share data
- Choose
  - who to share with
  - What they share
- Create tailored interfaces





Sleep monitor  
Beddit



Blood glucose levels  
Freestyle Libre/ DAFNE



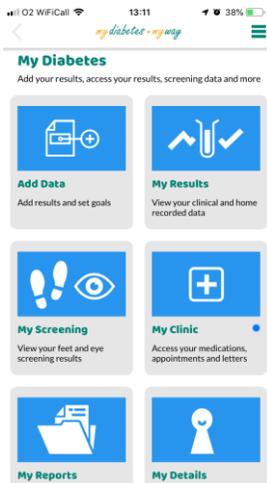
HealthKit  
Apple



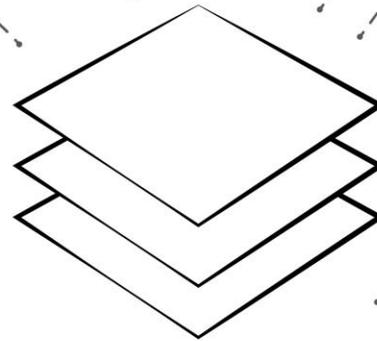
Nutrition  
MyFitnessPal



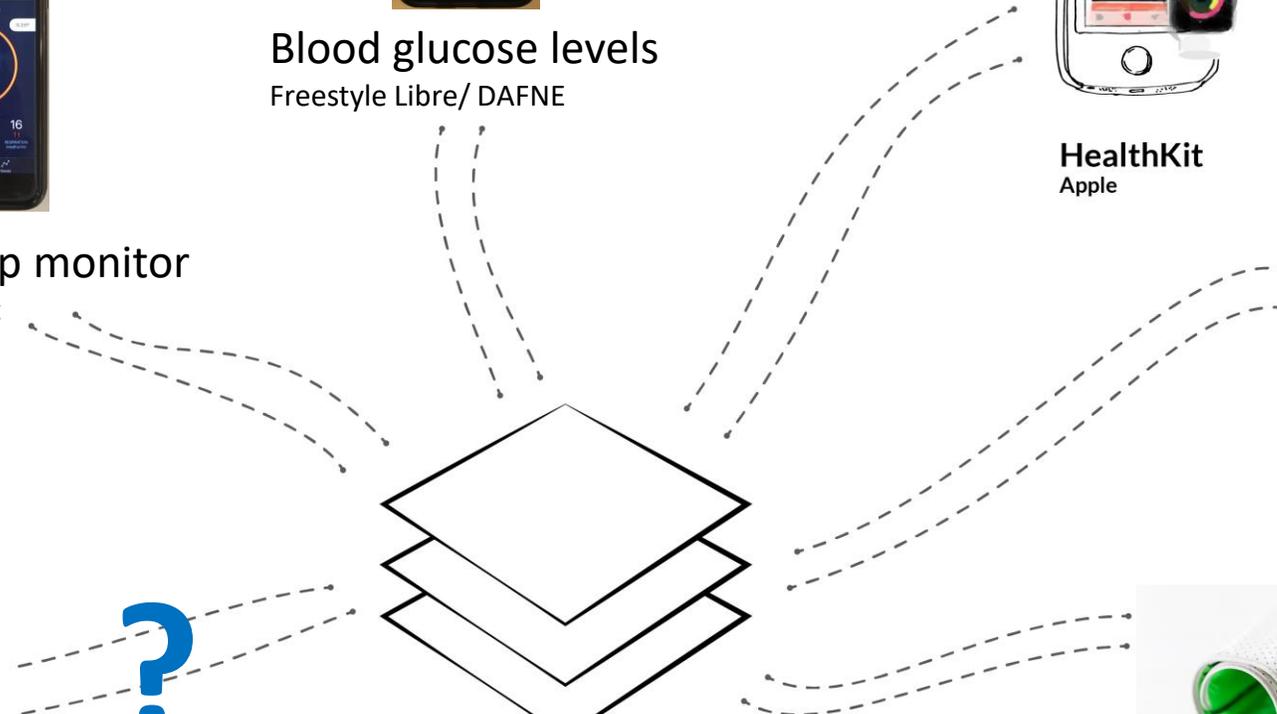
Blood pressure  
Nokia



Diabetic Results  
My Diabetes My Way



DHI Exchange Layer  
StormID



# What could this look like?



Leonard McCoy

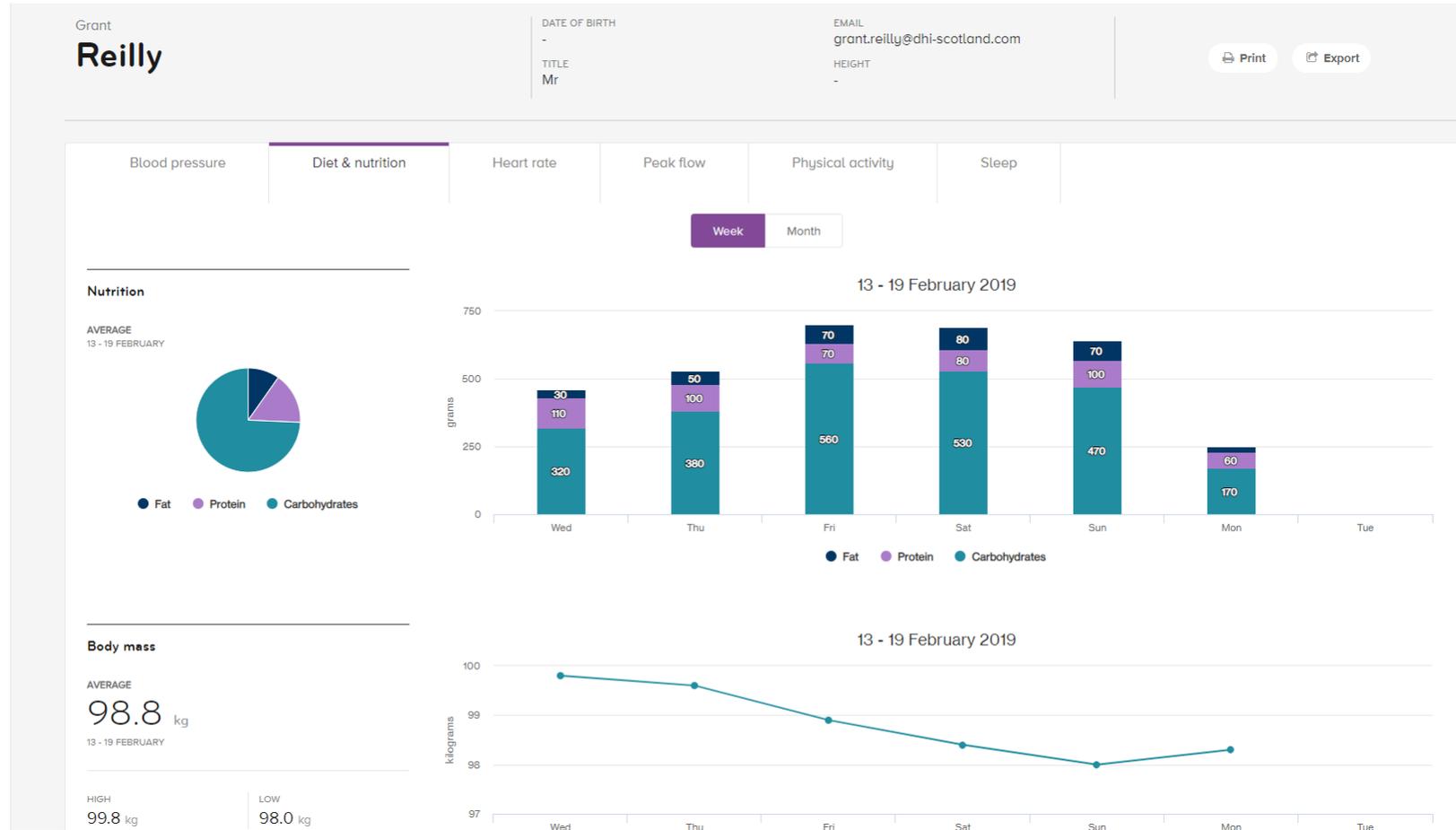
Search

Patients

Request patient data

Account

Log out



# Connect



[dhi-scotland.com](http://dhi-scotland.com)



[linkedin.com/company/dhi-scotland](https://www.linkedin.com/company/dhi-scotland)



[twitter.com/dhiscotland](https://twitter.com/dhiscotland)



[grant.reilly@dhi-scotland.com](mailto:grant.reilly@dhi-scotland.com)



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