



Norwegian Centre for
E-health Research

The patient's perspective

Status and future trends

Eirik Årsand, Professor in eHealth/cyber physical systems
Diabetes type 1 user



Status and future, for gathering of patient data

With mostly diabetes as an example:

Status: Apps, watches, sensors, social media
Do-It-Yourself (DIY)

Future: robots, implantable,
DIY, AI, machine learning...





Patients: “we need easy to use systems!”

Status: Fully automatic health data transfer



e.g. glucose meter
«Contour NEXT ONE»



and «Accu-Chek Guide»



Status: Fully automatic data transfer



Physical activity
(ex. XIAOMI MI BAND
or FitBit)

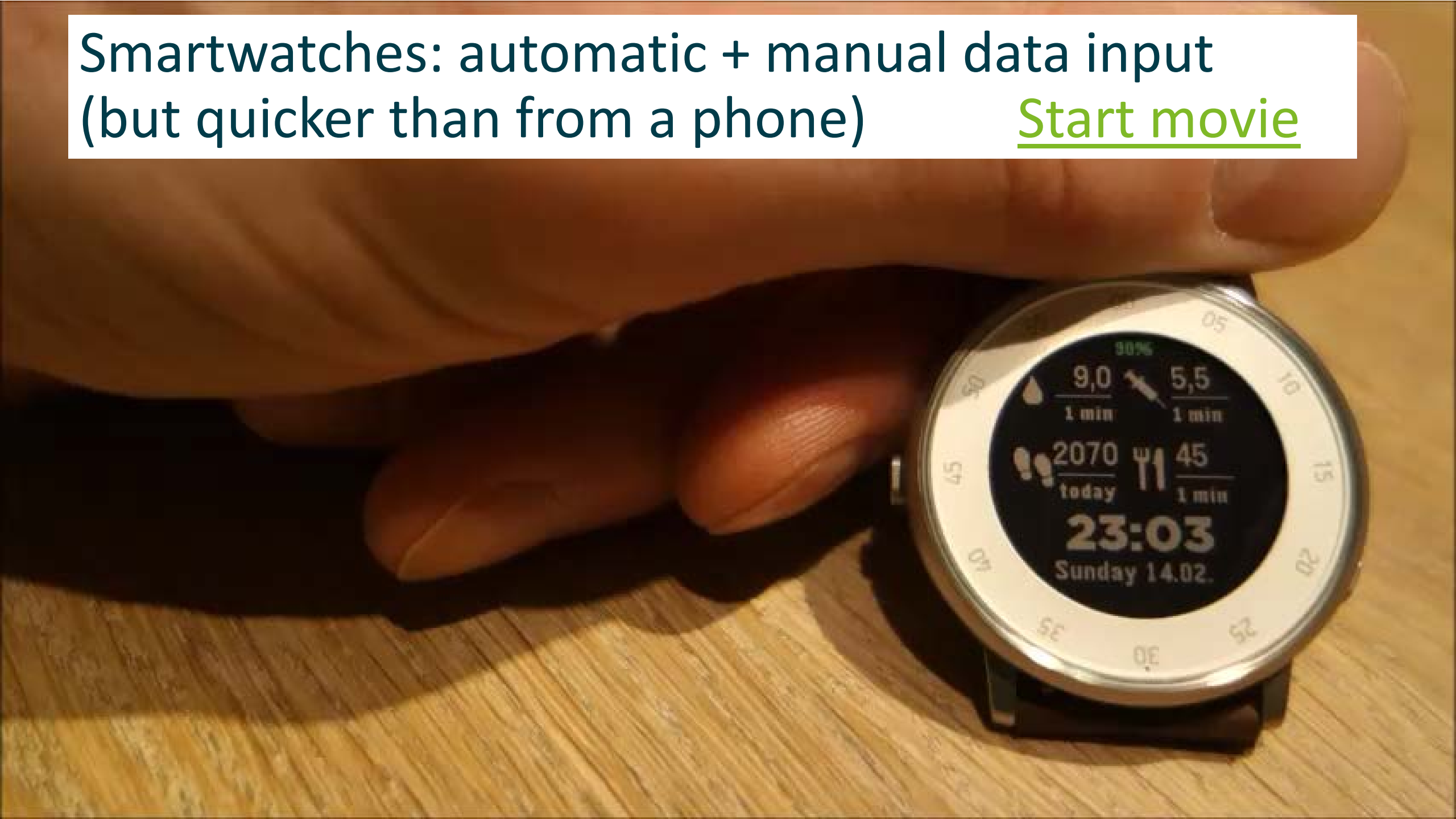
Automatically transferred
into apps, etc.



Icon	Value	Device/Note	Time
●	8,5 mmol/l		14:24
🔴	10,0 mmol/l	Contour7802H6...	14:01
🍷	2,0 E		13:49
🔴	10,0 mmol/l		13:48
🍴	15 gr		13:03
🔴	6,5 mmol/l		13:03
🔴	9,5 mmol/l		12:08
🔴	11,5 mmol/l		11:28
🚶	123 min	6818 skritt	11:27
🔴	11,0 mmol/l		10:40
🔴	9,0 mmol/l		10:05
🔴	6,4 mmol/l	Contour7802H6...	09:23
🍷	3,0 E		09:15
🍴	45 gr	Brødskiver x 3 m...	09:15
🔴	7,0 mmol/l		09:08
🍷	20,0 E	Lantus (basal)	09:08

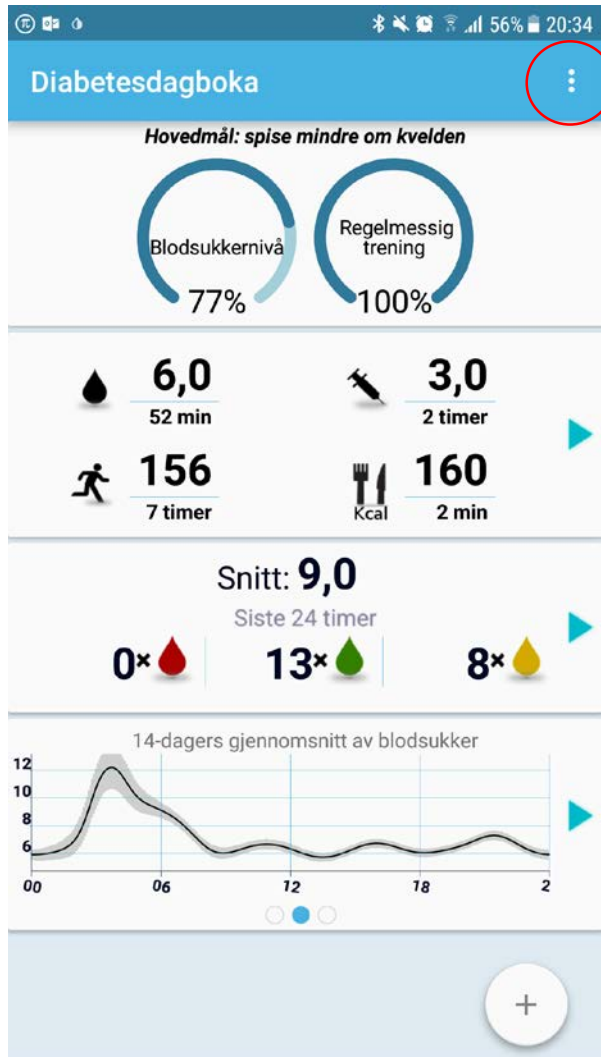
Smartwatches: automatic + manual data input
(but quicker than from a phone)

[Start movie](#)





Future concept: Tailor which data to gather (manual or automatic)



Hvilke data ønsker du å overvåke?

- Blodsukker
- Insulin
- Weight
- Aktivitet
- Karbohydrater
- Calories

160 kcal | 1 OKT. | 20:31

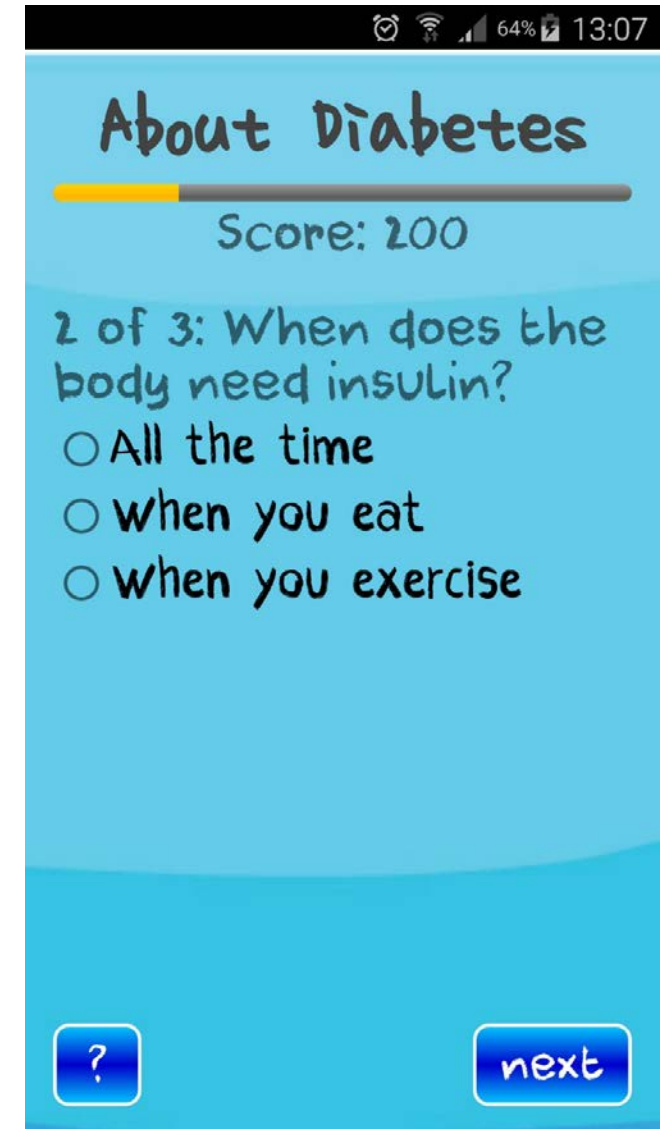
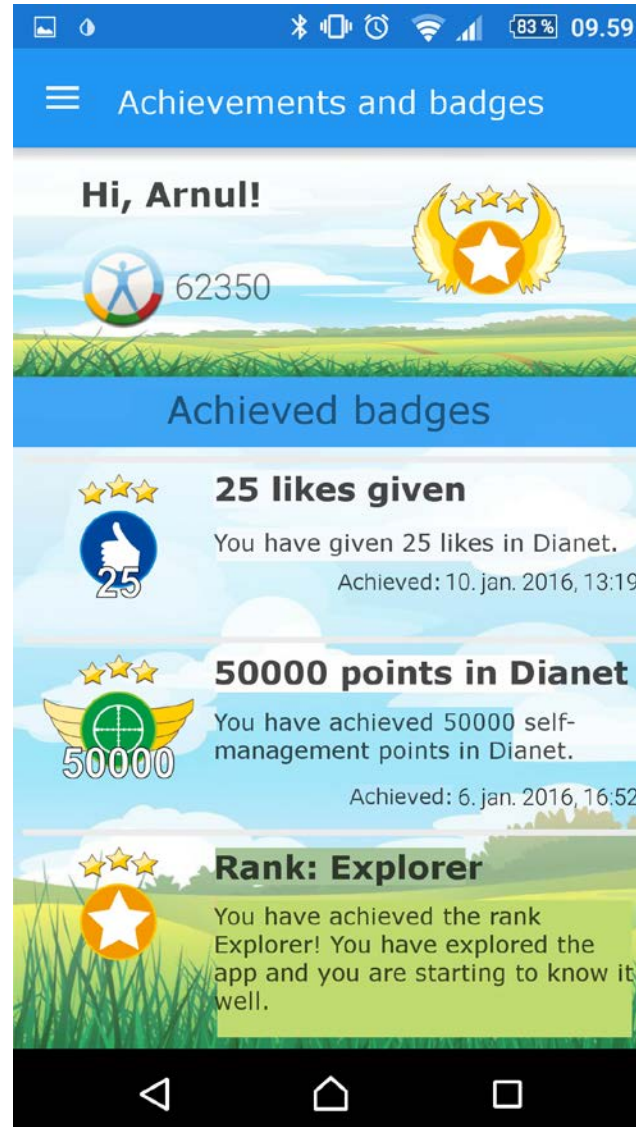
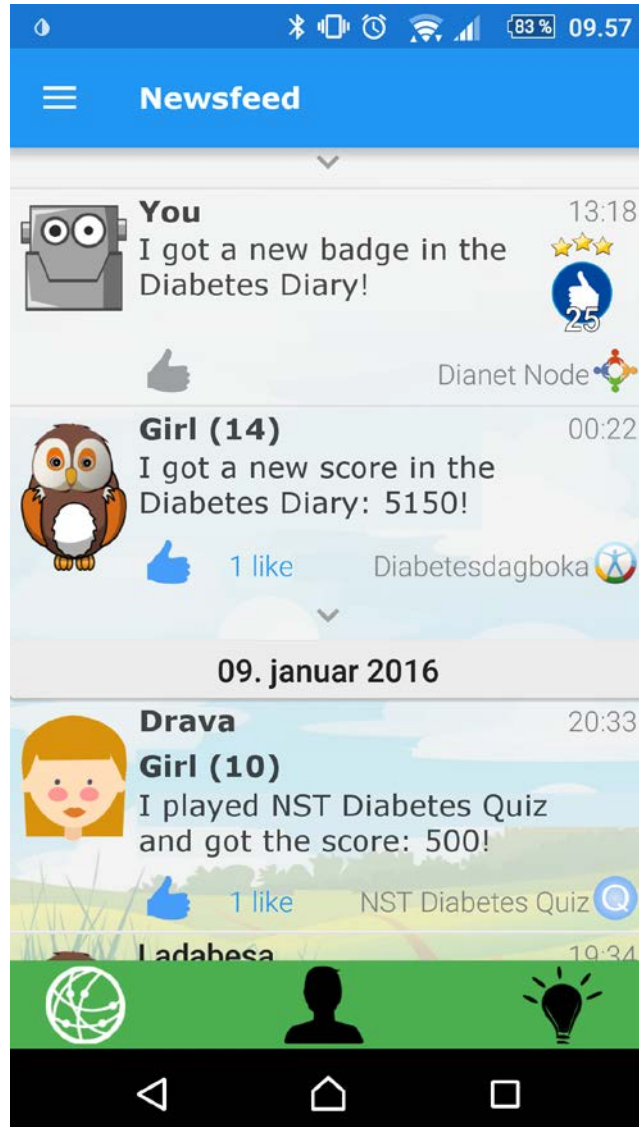
Banan, rå (83kcal/100g)

Søk i matvaretabellen

Ikone	Verdi	Merking	Tid
Blodsukker	6,0 mmol/l		19:41
Insulin	3,0 E	Rapid acting	18:26
Blodsukker	7,5 mmol/l		18:25
Blodsukker	8,5 mmol/l		17:55
Blodsukker	11,0 mmol/l		17:32
Insulin	2,5 E	Rapid acting	16:50
Matvare	25 gr		15:55
Blodsukker	5,5 mmol/l		15:34
Blodsukker	8,0 mmol/l		15:17
Blodsukker	9,0 mmol/l		15:13
Blodsukker	11,0 mmol/l		



Future: Serious Gaming / more motivation needed





Future: more Robotics e.g.

“The house of carbs”

Made by master student
Pietro Randine
(Now PhD-student)



Figure 1: First Prototype, based on communication with Dexcom G4 CGM and the Nightscout solution.



Social media – use is still increasing

Examples of patients' Facebook groups:



CGM in the Cloud

Gruppe

30 641 medlemmer



Nightscout Norge

Gruppe

1 525 medlemmer



For oss med Diabetes

Gruppe

8 460 medlemmer

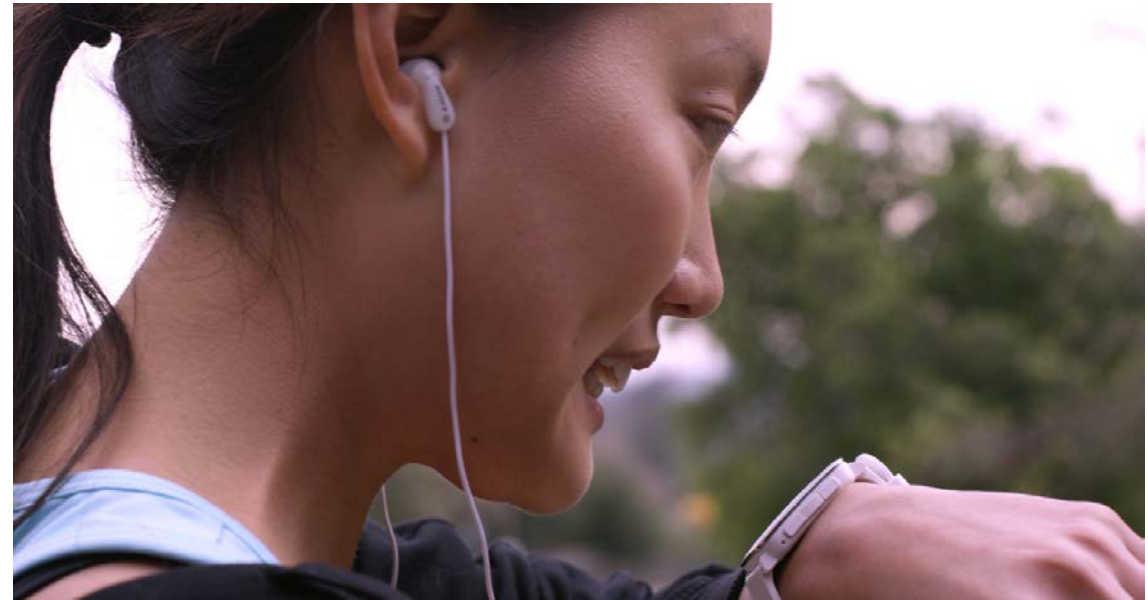


Future: we will talk (more) to our tools

Use of Alexa in Healthcare

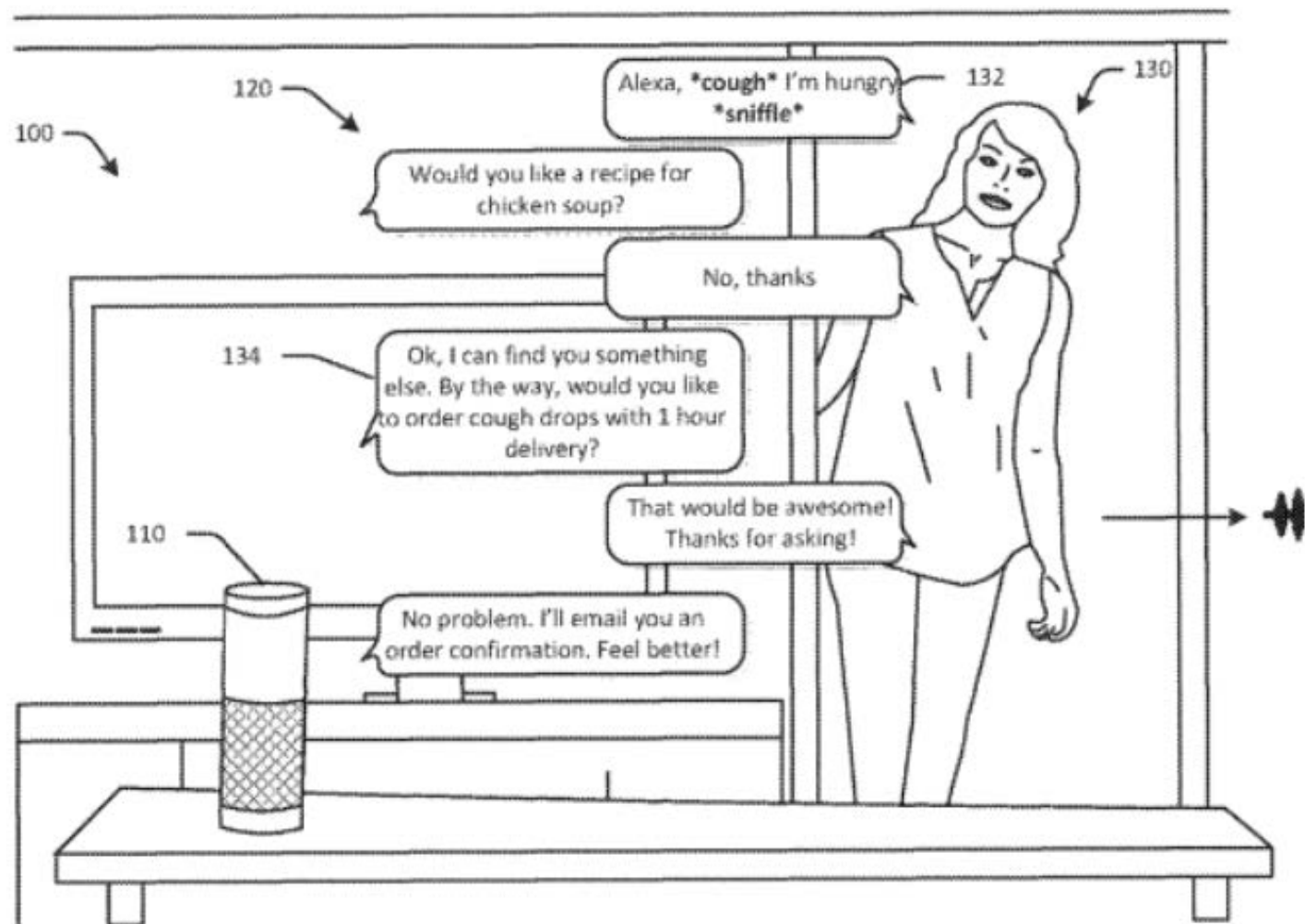
Today, Amazon announced that six **health care** companies and providers will allow customers to access some of their personalized medical information by talking to **Alexa**-enabled devices. ... Among the six skills that launched today, customers of Express Scripts can **use Alexa** to check the status of their prescription delivery.

Apr 4, 2019





September 2018: Amazon Echo patent is filed. Alexa can now recognize if a user has a cold





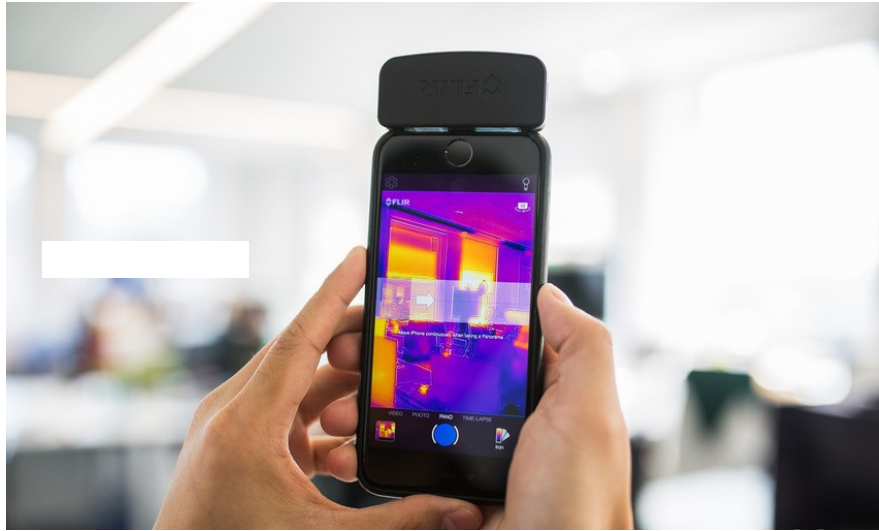
Medication intake will be recorded automatically



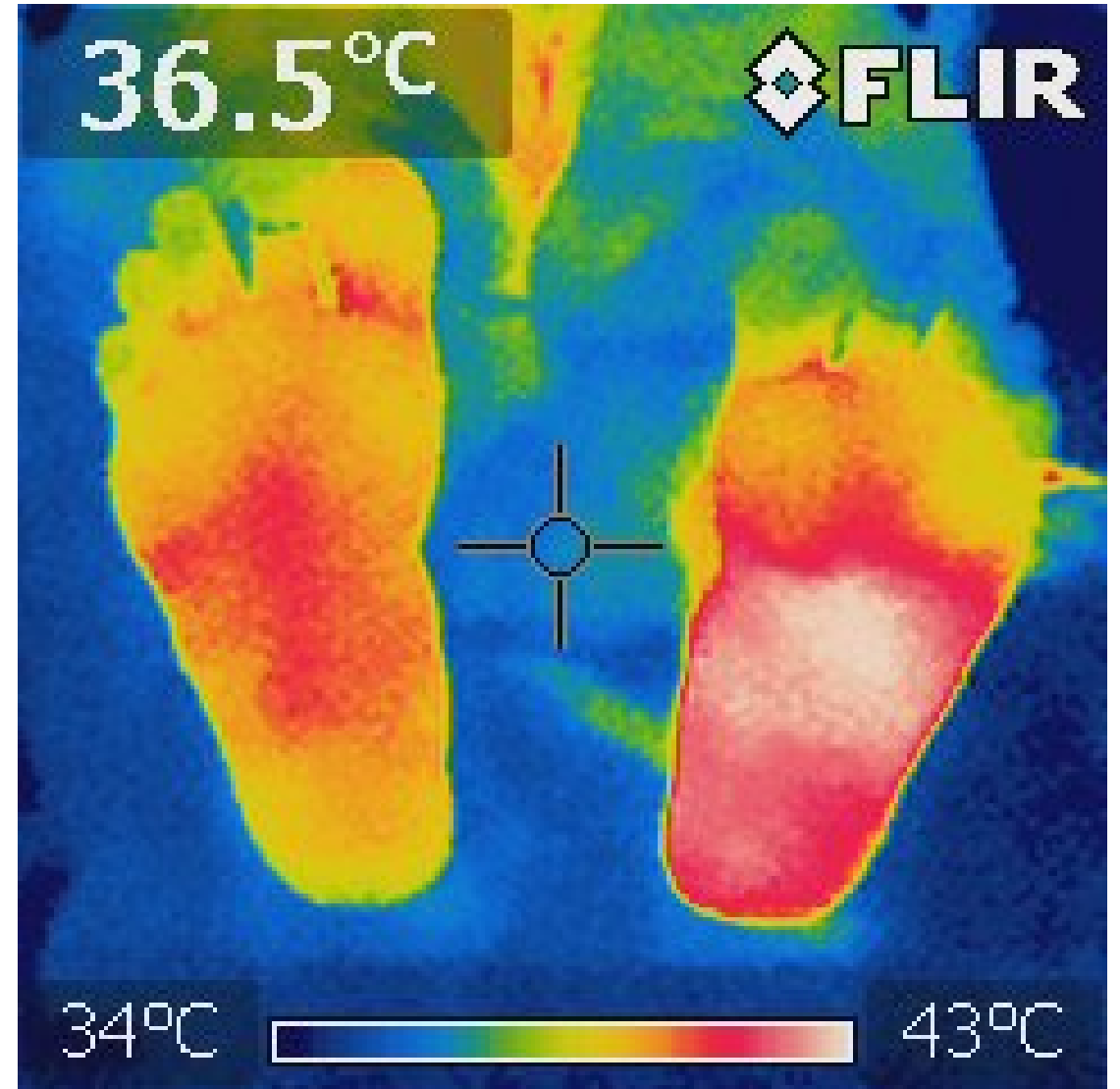
E.g. insulin pen “talking” Bluetooth



Pictures as data



E.g.: Using IR-camera on our own phone to monitor wound healing





Once upon a time... (before 2014)

We researchers were the ones that “invented the wheel”

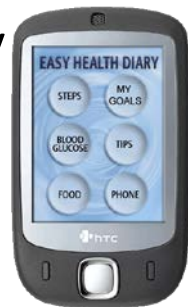
e.g. :

BG Bluetooth adapter → SMS



2003

Diabetes Diary app



2007

Smart step counter



2009

Smartwatch app



2014

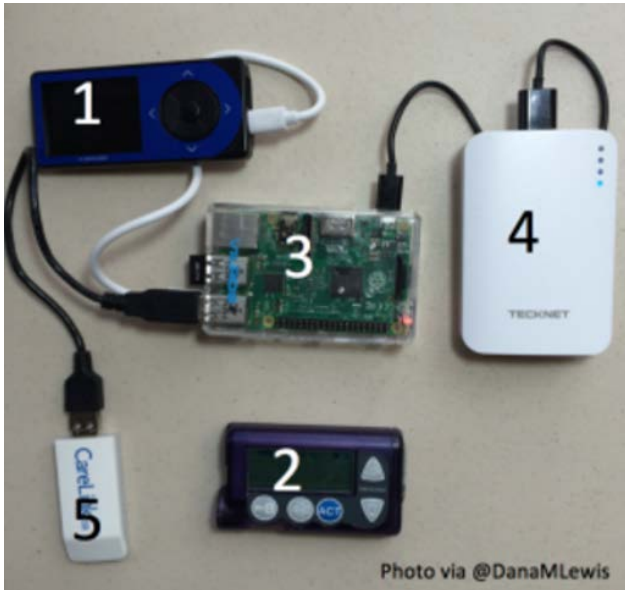
2020 → ?



What happened in 2014?



DIY for diabetes “went viral” on social Media in 2014
...and changed a lot!



FB: 30 861 medlemmer



Leading to:

Today, patients are superior!

- They just DIY (do it yourself)
- Of course, not all patients
- Those who are motivated
- AND – they do not need to be skilled themselves!
- They get help from peers on social media and online resources in general





because, patients are tired of waiting for the industry!



Source: <http://www.nightscout.info>

DIY-solutions are shared on social media

Twitter tag:

[#WeAreNotWaiting](#)



Also referred to as:



NIGHTSCOUT
#WeAreNotWaiting

Today, spread world-wide,

Norway:





They even make their own artificial pancreas



Alexander Getty

@gettyalex

After 2 days of problems related to infusion sets I have finally had a full glorious day of perfect [#Looping](#). I couldn't have done this without the incredible support of the online diabetes community.

[#wearenotwaiting](#) [#OpenAPS](#) [#Loopkit](#) [#Diabetes](#) [#Loop](#)

Oversett tweeten





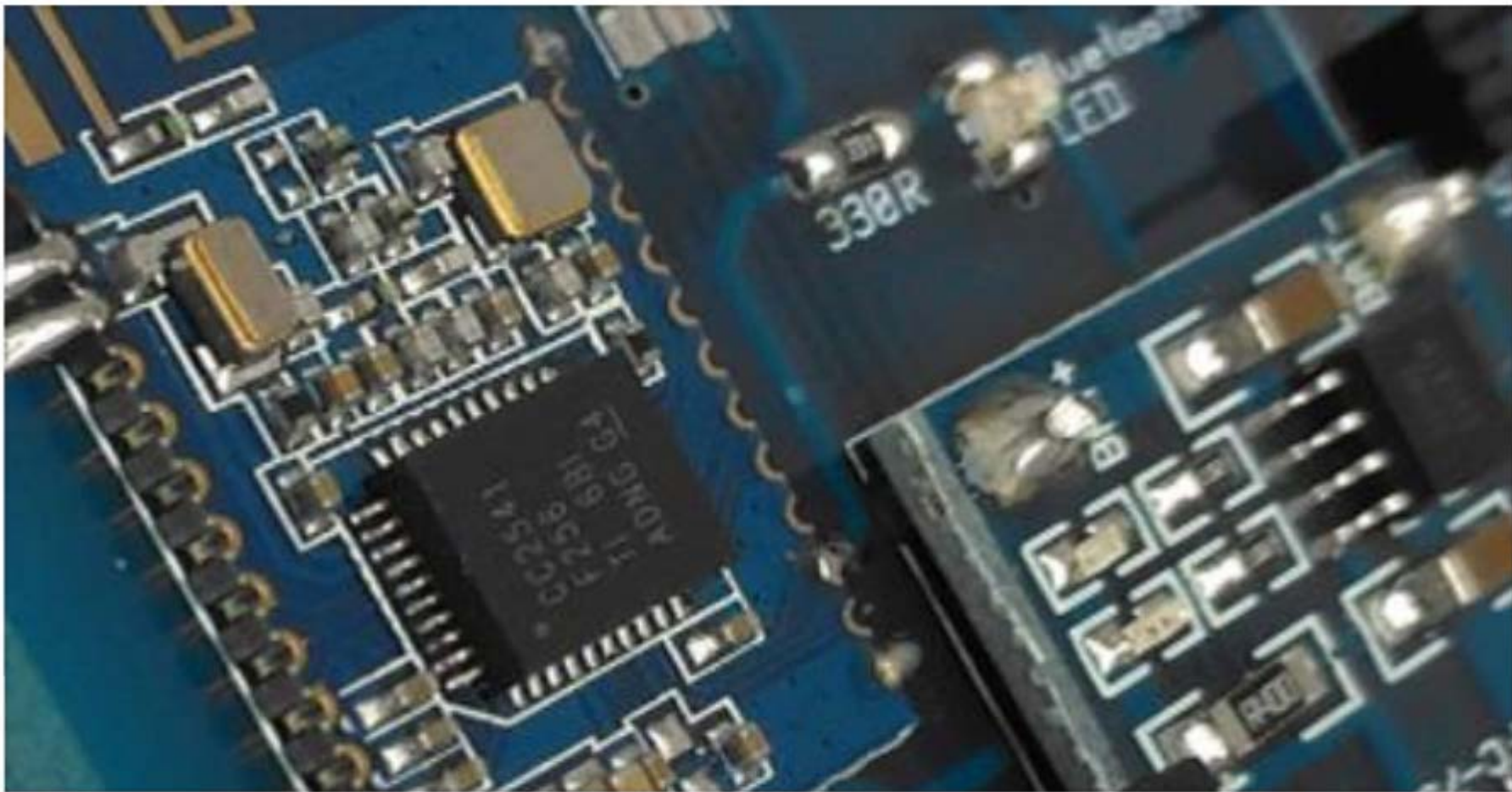
Also in Norway:

Ole Hejlesen
will later tell us
about a Danish
use case



**Pappa
har laget
bukspytt-
kjertelen**

Les også om:
PCOS
Gode ferietips
Startkurs
Industri-milliarder



The World's Simplest xDrip Kit

I am now supplying a kit to enable anybody to build an xDrip Kit [CGM](#) Continuous Glucose Monitor Receiver for Dexcom G4. [The](#) components of [the](#) xDrip Kit are all mounted onto one central Printed Circuit Board, making [the](#) Kit much more...

XDRIPKIT.CO.UK



🕒 02 JAN 2019 💬 0

Nightscout Car HUD (Head up Display) Page

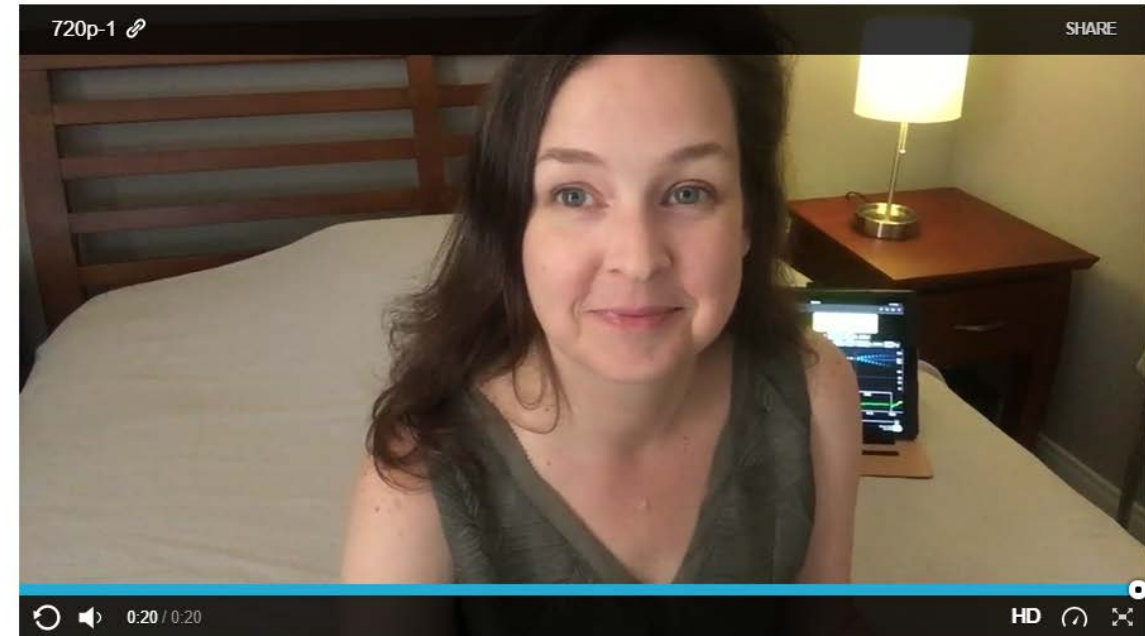
Today I was challenged to build a HUD (Heads up Display) app/page to allow NightScout CGM values to be projected from a mobile or tablet onto a car's windshield.



New ways of displaying sensor data

Smart Tech: My Lights Blink When My Blood Sugar is Low

I have integrated my body with my smart home! I now have an automated notification system that **blink my lights red 5 times when my blood sugar is too high or too low**. Let me show you...



As a person with Type 1 Diabetes, I must continually work to keep my blood sugar in a healthy range. For various reasons, my blood sugar can become too high or too low, and I need to be aware so I can respond accordingly.



Questions ? or Comments !

(to the patient's perspective on
patient gathered data)