UNIVERSITY OF TWENTE.

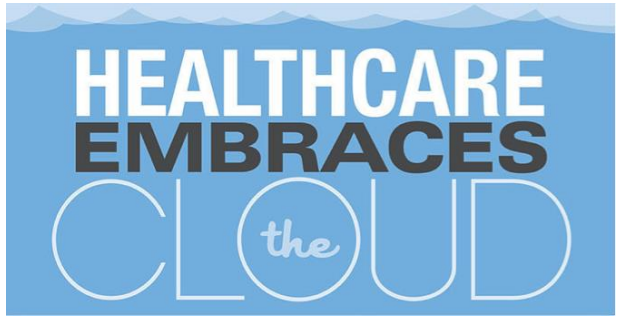
WEARABLE TECHNOLOGY IN CLINICAL CARE

FROM DATA TO VALUE

M.C. Hermans, 22 sept 2017

INDIVIDUALIZED MEDICINE ENABLED BY DIGITIZING HUMANS

How self-monitoring is transforming health



Schippers: 20 miljoen voor e-health initiatieven

WEARABLES IN CLINICAL CARE

Mobile diagnostics

Mobile intervention

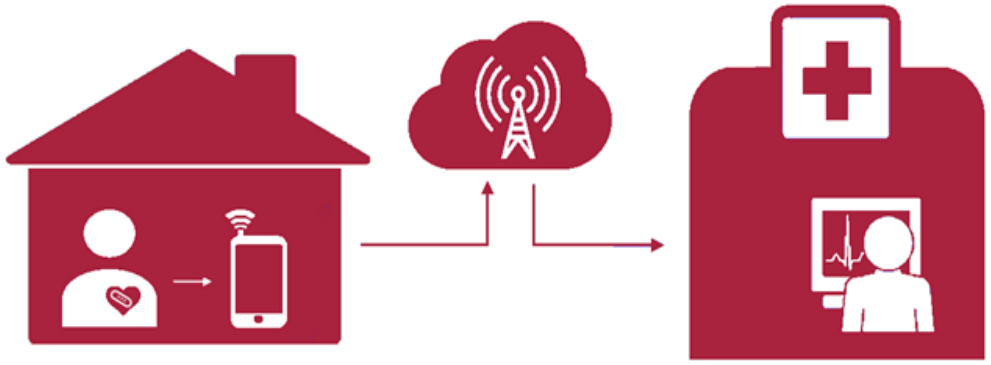
Remote follow-up

Self-management

Images by Mon Cardiologue, Medtronic Avery scribes,, Electronics weekly

BIG OPPORTUNITIES

More data	Earlier or better detection
Remote setting	Relocation of patient care
Mobility	Continuity, in daily context
Unobtrusive	Comfortable
(Low cost)	(Easily accesible)



BIG QUESTIONS

What about privacy & safety?

Place in clinical routine?

How can we interpret data?

Which technology do we need?

Is current technology suitable?

Effect on workflow & responsibilities?

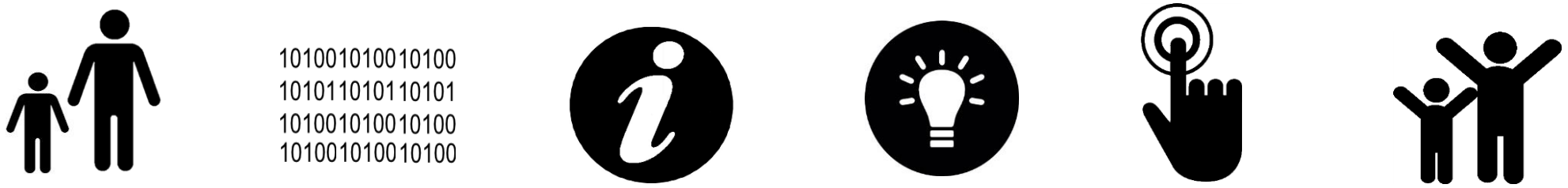
Impact on clinical outcome?

How do we want to use technology?

Suitable for all patients?

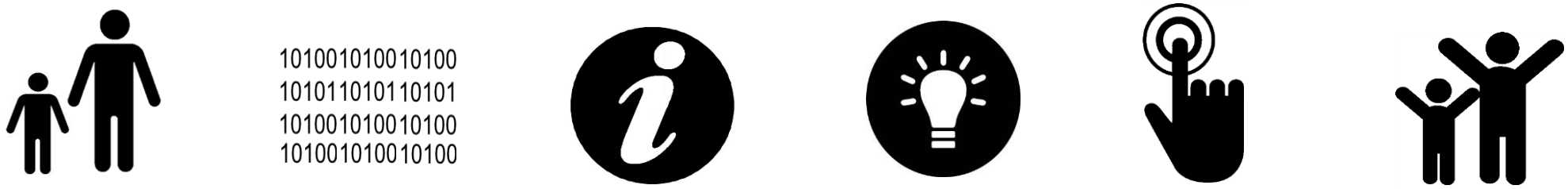
Do we really want this?

BIG CHALLENGES



Patient → Data → Information → Decision → Action → Impact

BIG CHALLENGES



Is current technology suitable?

TECHNOLOGY CRITERIA

Functional

Clinically usable

Privacy ensured

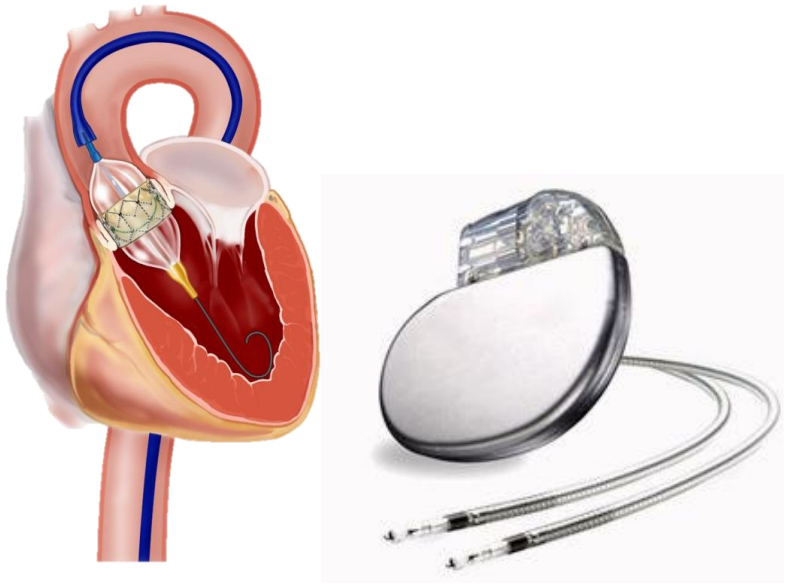
Safe

Comfortable

User friendly

WEARABLE VALIDATION

Transcatheter aortic valve implantation



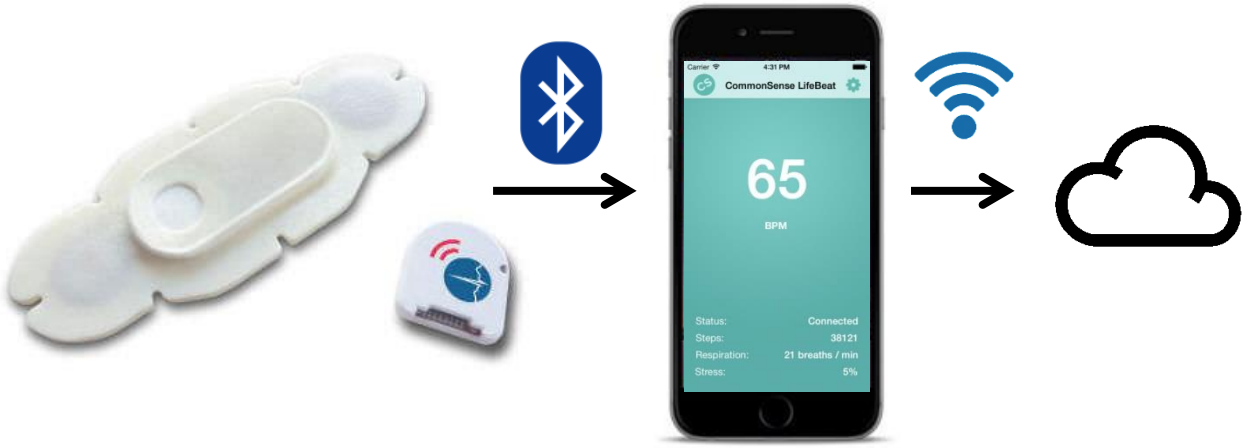
Postoperative pacemaker: 10-12% of patients

Remote follow-up: cardiac rhythm defects

Early discharge & prolongation of follow-up

WEARABLE VALIDATION

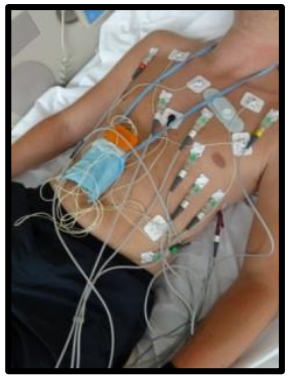
Wearable sensor tracking vital signs



Pilot studies for sensor validation

Simulator

Patients (N=4)

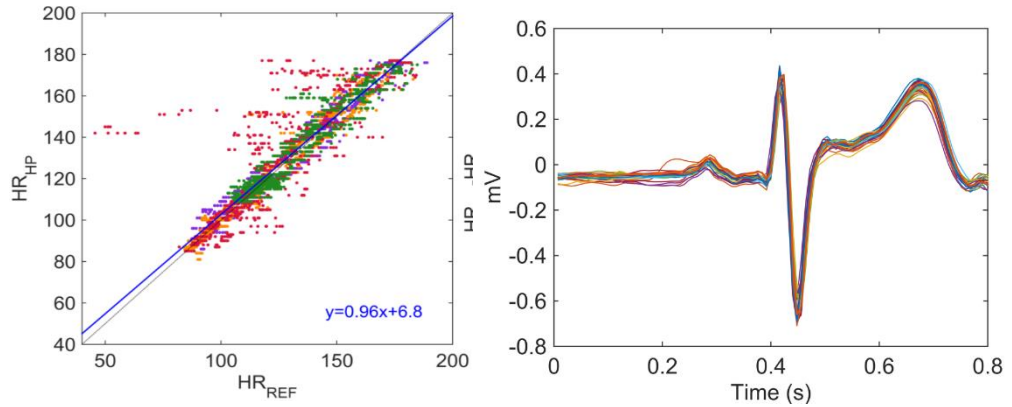


Healthy subjects (N=5)

VitalConnect, Campbell, CA, USA; Sense Observation Systems B.V, Rotterdam, The Netherlands

WEARABLE VALIDATION

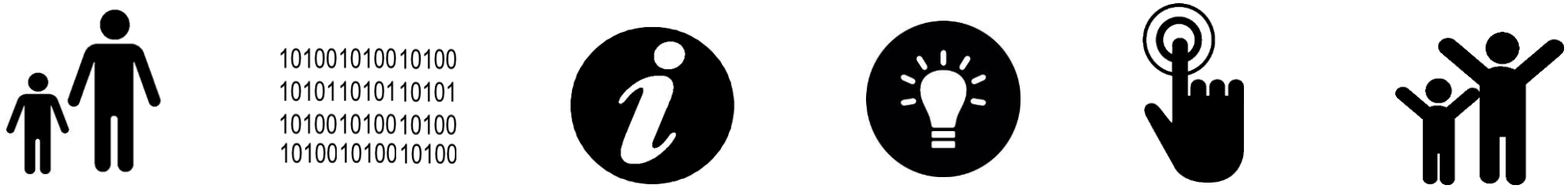
Evaluation of signal quality and accuracy



Events of interest are visible in data

But
… raw data not similar to current systems
… not accurate in all conditions
… limited functionality

BIG CHALLENGE

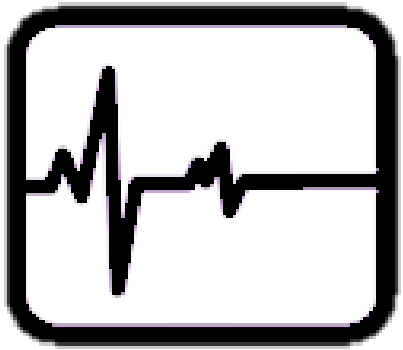


Patient → Data → Information → Decision → Action → Impact

How can we interpret data?

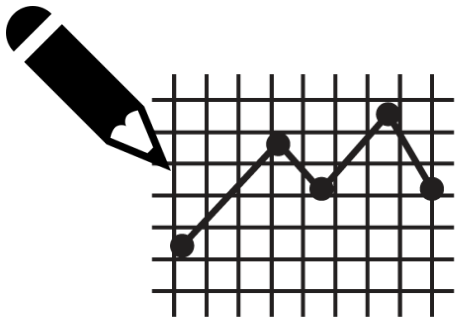
REMOTE MONITORING OF VITAL INSTABILITY

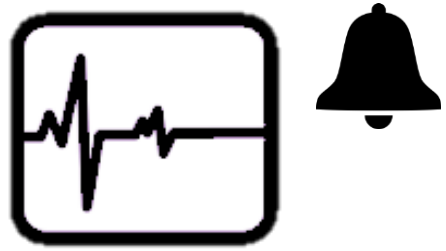
Early recognition of deterioration during and after hospital stay



REMOTE MONITORING OF VITAL INSTABILITY

Early warning score (EWS)	Remote monitoring
Once every 8-12 hours	Continuous
Manual assessment	Automatic
Standard thresholds	Adaptive alerts
Intramural	Intra- and extramural





REMOTE MONITORING OF VITAL INSTABILITY

Continuous monitoring brings a lot of data

... Manual interpretation is difficult

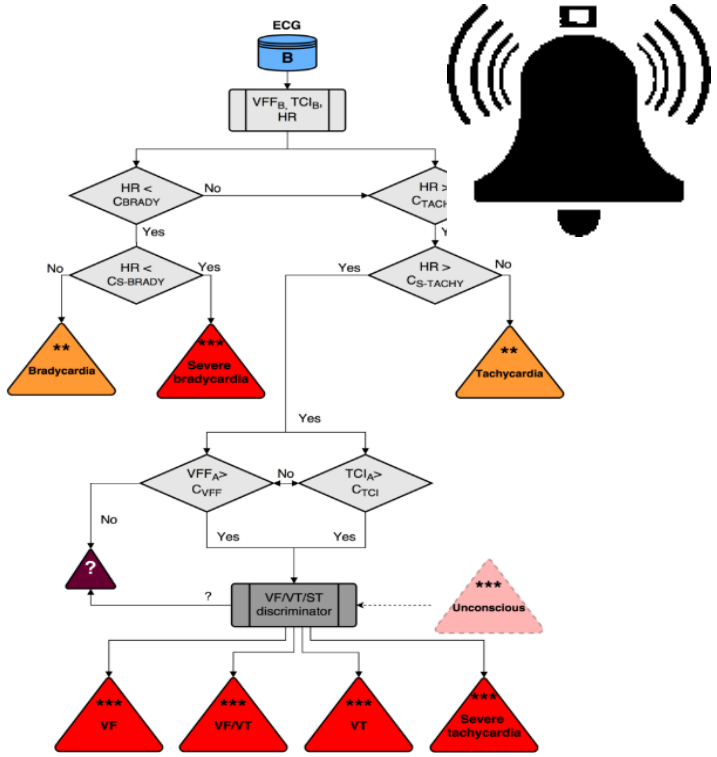
... Labout intensive

Decision support: algorithms

... Risk of alarm fatigue

... High complexity or intelligence desired?

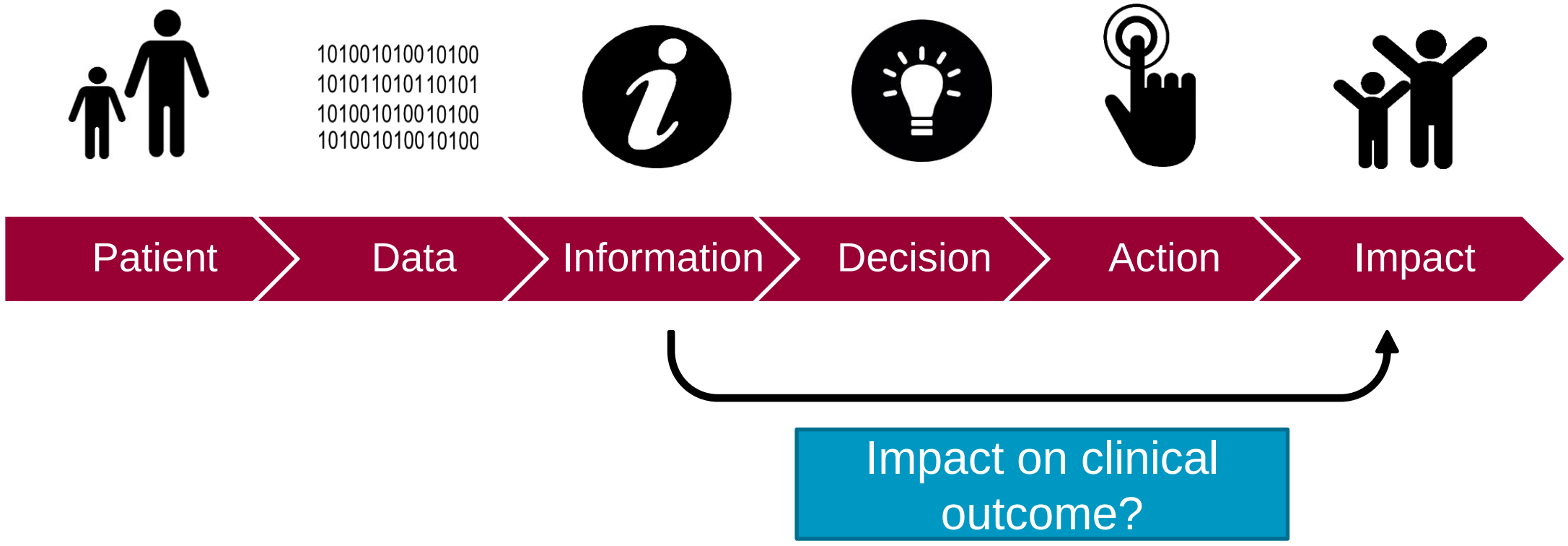
... Personalization?



REMOTE MONITORING OF VITAL INSTABILITY

Variations in context: increasing interest in non-physiological data

BIG CHALLENGE



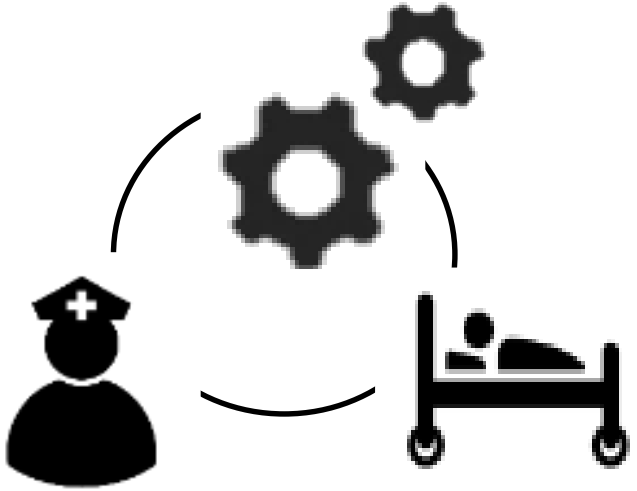
IMPACT

Implementation in clinical routine

... Elegibility of patients

... Actions and reaction

... New roles & responsabilities



VALUE

The value of mobile health is not just created by **novel technology**, but by a **novel way of using technology**

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